

# AMERICAN GAS ASSOCIATION MONTHLY

President Hewitt Dedicates Fountain of Flame  
at Century of Progress Exposition

100 Gas Executives  
At Chicago Ceremony

C. W. PERSON

3,370 Radiant Heaters  
Sold in Month

JOSEPH McKINLEY

Kansas  
Anti-Merchandising  
Act is Held Invalid

Model  
Gas Kitchen  
Increases Store Sales

A. G. A. Nominating Committee Reports for 1933-34



July 1933



## AN OPEN BOOK

The gas industry is an open book to the men who see it through the living pages of the A. G. A. PROCEEDINGS.

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**AMERICAN GAS ASSOCIATION**

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New York, N. Y.

# AMERICAN GAS ASSOCIATION MONTHLY

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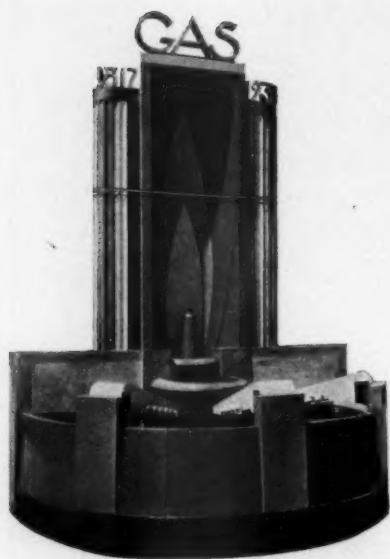
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The Association does not hold itself responsible for statements and opinions contained in papers and discussions appearing herein.

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## President Hewitt Dedicates Fountain of Flame at Century of Progress Exposition



**P**RESIDENT Arthur Hewitt, American Gas Association, delivering address, June 3, before group of executives at Fountain of Flame, situated at forecourt entrance to Gas Industry Hall at the Chicago Exposition. Rufus C. Dawes, president of the Exposition, followed Mr. Hewitt with a brief address, and a tour was then made of the gas industry's exhibits.

TO COMMEMORATE  
A CENTURY OF PROGRESS  
IN THE GAS INDUSTRY  
THIS  
FOUNTAIN OF FLAME  
SYMBOLIZING SERVICE TO  
MANKIND THROUGH CONTROLLED  
HEAT AND FLAME  
WAS DEDICATED BY  
ARTHUR HEWITT  
PRESIDENT OF THE  
AMERICAN GAS ASSOCIATION  
JUNE THIRD AT  
A CENTURY OF PROGRESS  
INTERNATIONAL EXPOSITION  
CHICAGO, ILLINOIS  
1933

# AMERICAN GAS ASSOCIATION MONTHLY

Allyn B. Tunis, Editor

VOLUME XV

JULY, 1933

NUMBER 7

## 100 Gas Executives Attend Chicago Ceremony



Arthur Hewitt

**T**HE Fountain of Flame, situated in the forecourt entrance to Gas Industry Hall at the Century of Progress Exposition, was dedicated June 3 by Arthur Hewitt, president of the American Gas Association.

Present at the ceremony were more than one hundred officials of the gas industry who were in Chicago attending the Executive Conference of the Association.

Symbolizing the service rendered by gas through the medium of heat, the Fountain of Flame is a tall pilaster-like structure, about twelve feet high, which glows with various luminous colors among which is one resembling red hot iron, suggestive of the use of gas fuel in the industrial and metallurgical industries.

Across the top of the structure is the word "Gas" silhouetted against a jet of luminous gas flame symbolizing the service being rendered by natural and manufactured gases in modern civilization. At the top of a fluted column to the left appears the year "1817" in block letters, designating the year in which the gas industry was born in

By Charles W. Person

this country. At the top of a similar column to the right is "1933," symbolic of the 116th year of the gas business in the United States.

The fluted columns glow with various spectral colors, while in the concave central niche of the fountain is shown a large luminous flame. At the base of this flame a jet of colored and luminescent water bubbles forth and cascades into lower pools.

In his brief address President Hewitt spoke as follows:

"In answer to Chicago's invitation to come and see what the mind of man has been up to during the most dramatic of all past centuries, 1833 to 1933, we are, happily, among the first representatives of basic American industries to visit A Century of Progress International Exposition.

"The theme of this vast undertaking and its 12,000 exhibits is mankind's mastery over nature, with science and industry dominating the picture. Few industries, I may truthfully say, fit into this picture with such exactness as the gas industry. We have taken coal, nature's black diamond, and have converted it into the highest form of refined fuel, in the meantime making available to science a vast treasure chest of by-products. We have taken natu-

ral gas, a fuel beyond the ingenuity of mankind to duplicate, and have subdued this giant to a point where it has become a tranquil and obedient servant of home and industry.

"At the beginning of this century, we were the bearers of light. One use only was made of gas—illumination. Shortly thereafter came the industrial upheaval which threatened for a time to write our epitaph but which, instead, ushered in our rebirth. We cast off our rôle as the bearers of light and entered the infinitely greater opportunities for service and growth awaiting us in the field of heating. Today we are dispensers of the cleanest and most versatile fuel available to mankind, an achievement so far-reaching in its consequences that it has altered the face of civilization.

"Visible evidences of the gas industry's contributions to a century of progress in science and industry are seen in every part of this great Exposition project. The formal exhibits located in Gas Industry Hall, Home Planning Hall, General Exhibits Building and elsewhere portray the old and new in the field of heat utilization and the strides made therein by gas fuel. Ultra-modern developments in home comfort and convenience, depicted in striking fashion in the model homes, rely upon gas fuel for their fulfill-

ment. Here gas fuel takes a bold step forward and enters the realm of air-conditioning, making it possible for the home maker to become her own weather maker, winter and summer.

"In the fabrication of automobile tires, the manufacture of automobiles and the production of other articles in some of the 'live' exhibits found on the grounds, gas fuel makes possible the animated and realistic effects. Even more satisfying, however, is the extent to which this Fair relies upon gas fuel for cooking, space heating and water heating. We dominate the restaurant and other kitchens here as we do elsewhere throughout the nation, and the many structures erected on these grounds are ninety-eight per cent gas heated. Under the terrain of this site are 26,000 feet of gas mains—unseen evidence, unfortunately, of the vital service we are called upon to render.

"Into the making of this Exposition have gone five years of courageous planning, unaltered by the collapse of trade and the disorganization of business. Chicago's slogan, 'I Will' has become a victorious reality, again demonstrating to the world that when a people resolutely persist in doing a thing they have the power within themselves to do it. There is a lesson here for all mankind to learn."

Rufus C. Dawes, president of the Exposition, followed Mr. Hewitt with some brief remarks, in the course of which he emphasized the importance of gas service to the Fair and to America at large. Immediately after the ceremony a tour of inspection was made of the exhibits in Gas Industry Hall, Home Planning Hall, the model homes and other buildings where displays of definite interest to gas men are featured.

So much advance publicity has been given the Fair that Chicago is destined to be the Mecca of gas men this year. Many will defer their pilgrimage until the International Gas Conference and Fifteenth Annual Convention of the American Gas Association the week of September 25, with the idea of combining business with pleasure.

Chicago is eagerly awaiting the arrival of the A. G. A. representatives, as well as delegates to 905 other conventions that will meet in Chicago during the Fair period.

Estimates on how long it will require to take in the Exposition vary from a week, for a business man's whirlwind survey of the exhibits and a fling at the concessions to the entire five months' life of the Fair for the individual who wants to do a thorough job of it.

There are some striking differences between this Exposition and those of the past. In the first place, it fulfills every promise made by the management in the flush days of five years ago. There was no warning then of the long cold night that was soon to settle upon an over-hopeful world. For months on end the fate of the Exposition hung in the balance, with persons powerful in the realm of finance begging the Dawes brothers, and their workers to call off the project.

But the pleadings of the distraught went unheeded. Today A Century of Progress Exposition is truly an astounding phenomenon of the depression, undefeated by commercial failures, low economic morale, or the despairing of men everywhere. On the Fair grounds stands every structure that appeared in the architects' conception published three years ago. These buildings and the thousands of exhibits in them convincingly demonstrate that America has a future as well as a past, and that its people still have substantial reserves of courage.

Other Fairs both in this country and abroad have boasted of their bigness, but this is the biggest creation of them all. There are 60 buildings of bewildering form and hue strung in array along the strip of "manufactured" land on the city's lake front, a few blocks from the Loop District. There are 82 miles of corridors inside the buildings and pavilions. Altogether, there are 12,000 individual exhibits. The Exposition grounds cover 428 acres. The distance from the main entrance gate to the farthest end of the grounds is three and one-half miles. Fortunately, there is transportation to save part of the wear and tear on one's feet.

Another point of difference between this Exposition and its predecessors is the architecture of the buildings. This is the world's first two-story Fair. For the first time Crystal Palaces and the ornate gingerbread decorations of the past are missing. Having discarded

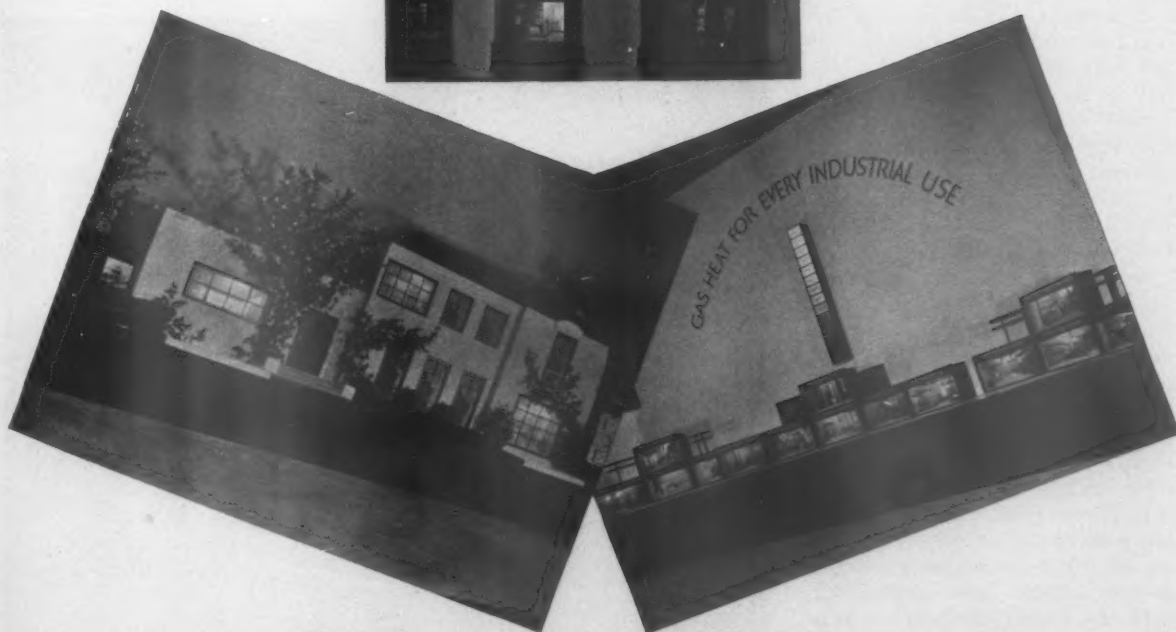
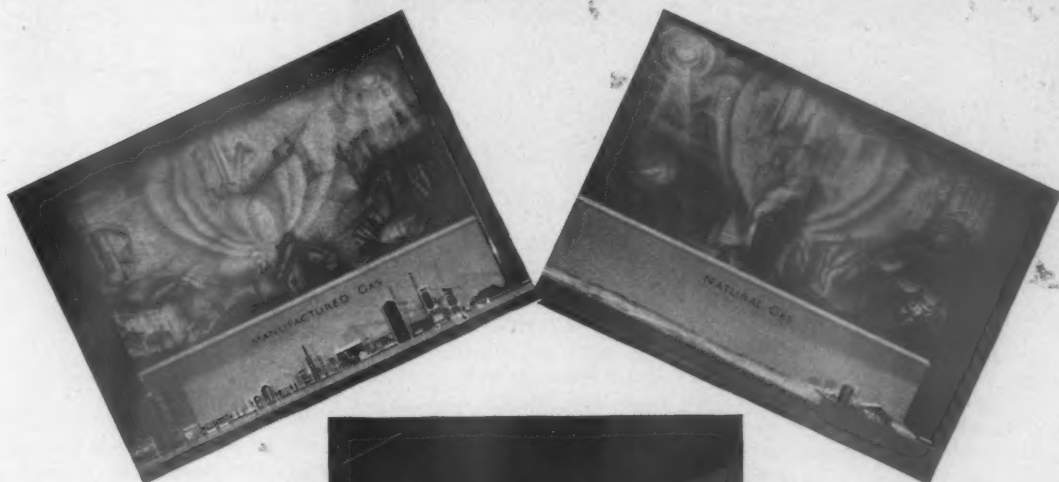
that tradition, architecture had nothing left to work on, so it hitched itself to science, and buildings were planned to fit their individual uses. So this became the first two-story Fair. Long ramps make the use of steps unnecessary (although stairways are there), and the arrangement of exhibits is such that the spectator naturally goes to the top and drifts downward by easy gradients.

The buildings themselves are of a dazzling originality that challenges the visitor's startled attention. They have been called gas tanks, train sheds, grain elevators, and hay barns, but they are honest, functional structures. They have been erected on an economical scale as possible, consistent with safety. As the Fair buildings of 1893 were haunted by ghosts of the past, those of 1933 are peopled with portents of the future. Inside and out the structures are Twentieth Century creations. There are great planes of windowless walls, horizontal terraces, inclined ramps, vertical pylons, geometric towers, and a dome constructed for the first time in history on the principle of a suspension bridge, hung from spider-web "sky hooks" instead of being supported from the ground. It is in reality a "dome that breathes," made with joints that expand and contract as the temperature varies, resulting in a difference of more than 6 feet in circumference and a difference of 18 inches in height.

To complete the picture, there are courtyards, too, and lagoons and fountains, islands and peninsulas, on which buildings are outlined against lake and sky. There are bridges and balustrades and outdoor forums and platforms and acres of miniature structures comprising the children's portion of the grounds, and other structures the like of which the present generation has not seen before.

The artists had before them not only the economy of construction necessary in housing such a gargantuan undertaking, but they were obliged to vision the foot-weariness of the multitudes who would want to see everything. Perhaps the consideration for economy came first, as it necessarily would in times such as those we have presently witnessed. On the other hand, the depression, in many ways, has been an asset to the Exposition. Dollar for

## Views of Gas Industry's Exhibits at Chicago Exposition



Murals, dioramas, cut-outs and models are utilized in the Gas Industry Exhibit to portray the story of gas fuel. At top are combination murals and models of the manufactured and natural gas industries. The center picture shows three dioramas and murals emphasizing advances of gas in heating, cooking and industrial use. At left below is model home, built to half-scale size. At right below are fourteen dioramas depicting uses of gas in industry.



*Pittsburgh Equitable Meter Company's display at Century of Progress Exposition*

dollar, the money spent has bought more than would have been possible at any time within the past twenty years. The cost of building and materials has been lowered. The staff has been trained to think in terms of expenditures that were essential only to the holding of the Fair. For the most part the Exposition structures and pavilions have been built for 15 cents a cubic foot or less—a cost smaller than that of building some of the halls for the World's Columbian Exposition of 1893. They are constructed of modern materials,—asbestos, cement board, sheet metal, gypsum board and plywood.

In the erection of the buildings savings have been effected that may suggest important applications to the future of the building industry. The erection of many of the windowless and artificially lighted structures was governed by a desire for economy, and to insure control of the volume and intensity of light at all times and under every atmospheric condition.

In another important respect, A Century of Progress Exposition is different from other national projects of its nature. It is, indeed, a non-competitive Fair. As a matter of fact, this non-competitive feature is the kernel of the whole scheme of visual presentation. It means that for the first time static exhibits of a wax-works nature have become passé, grand awards are out, and, instead of industry contesting for excellence of product, whole lines of industry move together and show the whence and why of their product, its method of manufacture, its distribution, what it means to the comfort and advancement of mankind,

and what it has to do with the American standard of living.

Starting at the beginning and leading the observer upward in interest and education, there is a smooth continuity. The method is so fundamental that the child readily absorbs the unfolding of knowledge, and the elderly person feels his or her experience enriched. The key to this simple and effective continuity is the diorama. It is said that if nothing but dioramic exhibits were shown, the Fair would be a soul-satisfying experience.

The diorama was conceived and partially developed in France. It was used

successfully by the British, at the Wembley Exposition, in 1926, and again in Paris, in 1931. But, not, however, such dioramas as are shown at Chicago. The Century of Progress dioramas are three dimensional affairs and they carry the eye for miles or focus it on the interior of a tiny laboratory. The optical illusion is perfect. The largest diorama at the Fair is 90 feet long. In keeping with the spirit of the Exposition, animation has been built into the dioramas and other exhibit features. Most of the largest displays are full of motion. The assembling of automobiles is shown, as well as the fabrication of automobile tires, the manufacture of steel products, and other visual presentations of the actual steps taken in the conversion of raw material to the finished article.

In still another outstanding respect this Exposition is unique. As one Chicagoan has aptly expressed it, "There are no grafters in on this show. The corps of politicians, racketeers, and sly old boys are on the outside, dolefully watching the pickings go untouched." The Exposition represents, roundly, an investment of close to \$30,000,000. Exactly \$800,000 has come from the

(Continued on page 300)



*Electrolux refrigerator exhibit at Chicago with A.G.A. Dioramas in background*

# Kansas Anti-Merchandising Act Is Held Invalid

**A** DECISION of far reaching importance to utilities and of interest throughout the country was handed down, June 10, by the Kansas Supreme Court when it held the Kansas anti-merchandising law unconstitutional.

The decision holds invalid the law enacted by the 1931 Kansas Legislature which forbids utilities operating in the state from selling appliances.

Test cases had been brought in the name of ten Gas Service Company subsidiary companies that were merchandising in Kansas. The case was filed in the Shawnee County District Court and later appealed to the Supreme Court when the lower court held the act was valid.

The Gas Service Company appealed the case and successfully proved that the law was unconstitutional. Every other

utility operating in Kansas ceased merchandising when the law went into effect, the Gas Service Company subsidiaries being the only organizations to take the case to the courts to prove the unconstitutionality of the law. The ten Gas Service Company subsidiaries continued to merchandise under a temporary injunction, pending the final decision of the cases.

Although many attempts have been made by state legislatures in the past four years to prohibit utilities from merchandising, Kansas and Oklahoma were the only two states to pass anti-merchandising laws. In these two states laws passed in the 1931 session, proved a detriment to the various communities and in this respect placed a greater hardship on the smaller communities where it is difficult to obtain service on

appliances if the utilities are not permitted to handle parts and give service.

In Kansas many of the utilities were forced to discharge their salesmen and appliance men. This came at a time when business conditions in the various cities were bad and necessarily deprived merchants of the benefits derived from the income these men were receiving. The law also resulted in empty storerooms in many towns and

would serve no useful purpose and defeated bills in both sessions. Newspapers in Missouri were strong in denouncing the attempts to have this type of legislation placed on the Missouri statute books.

The Kansas Supreme Court decision doubtless will have an effect on similar attempts that would have been made in the future in many states to pass this type of legislation.

## Syllabus of Decision

1. Where a public utility corporation is authorized to do business in Kansas in the manufacture, purchase, supply and distribution of artificial and natural gas, the sale of gas appliances by it, under the facts and circumstances set out in this opinion, is intimately connected with and incidental to the sale and distribution of gas, and is an implied power of such company because it directly and proximately tends to accomplish the general purpose for which the company was incorporated.

2. That Chapter 238 of the Session Laws of 1931 is unconstitutional and void because it is in violation of the 14th Amendment of the Constitution of the United States in that it denies to certain individuals, firms and corporations the equal protection of the law.

Utilities and appliance manufacturers throughout the country have been awaiting with much interest the Kansas decision.

The anti-merchandising law passed by the 1931 legislature in Kansas became effective March 13, 1931, and prohibited sales after August 1, 1931.

Ten of the eleven cases filed with the Shawnee District Court on August 3, 1931, under the

names of the various subsidiary companies of the Gas Service Company, were consolidated in one suit under the Declaratory Judgment Act seeking a declaration that the merchandise law was unconstitutional. A temporary restraining order was granted by the court allowing these ten companies to continue to merchandise and later a temporary injunction was granted which prohibited the state from interfering with the companies selling appliances.

## Newspapers Fight Act

An attempt to repeal the anti-merchandising act in Kansas lacked only a few votes of passing in the legislature early this year. Newspapers throughout the state were lined up almost solidly against the bill and many columns of news stories and editorials appeared condemning the legislation ever since it was passed by the 1931 legislature.

In Missouri two attempts to pass anti-merchandising bills have been made, the first in the 1931 session of the legislature and the other in the 1933 session. Law makers in Missouri, however, realized this type of legislation was wrong in principle and that it

failed to accomplish one of its chief purposes, that of aiding the business of the hardware merchants.

## Sell Under Injunction

The Shawnee District Court in a decision handed down November 4, 1931, held that the law was valid. The case was then filed in the State Supreme Court and the companies continued to sell appliances under an

injunction. Following the Supreme Court decision the suits were remanded to the district court with directions for the issuance of injunctions.

The ten Gas Service subsidiary companies who sought to enjoin Roland Boynton, attorney general, from enforcing the provisions of the law were: The Capital Gas & Electric Company, The Wyandotte County Gas Company, The Girard Gas Company, The Newton Gas Company, The Arkansas Valley Gas Company, The Hutchinson Gas Company, The Wichita Gas Company, The Pittsburg Gas Company, The Union Public Service Company and the Western Distributing Company.

An eleventh case involved habeas corpus proceedings filed by Louis L. Roesle, new business manager of The Capital Gas & Electric Company, Topeka, Kansas, who was arrested and convicted of selling a gas burning appliance in violation of the statute.

Five of the Kansas Supreme Court judges declared the law unconstitutional, Justices W. W. Harvey and John L. Dawson dissenting from the court's majority opinion, although they did not present a separate opinion. The opinion was written by Justice William Easton Hutchinson.

The opinion held, "Where a public utility corporation is authorized to do business in Kansas in the manufacture, purchase, supply and distribution of artificial and natural gas, the sale of gas appliances by it, under the facts and circumstances set out in this opinion, is intimately connected with and incidental to the sale and distribution of gas, and is an implied power of such company because it directly and proximately tends to accomplish the general purpose for which the company was incorporated."

Relative to the unconstitutionality of the law the Supreme Court decision said, "That Chapter 238 of the Session Laws of 1931 is unconstitutional and void because it is in violation of the 14th Amendment of the Constitution of the United States in that it denies to certain individuals, firms and corporations the equal protection of the law."

The court held that the anti-merchandising act is not related to a questionable business, or something harm-

## Another Victory In Texas

The Court of Civil Appeals, at Austin, Texas, recently overruled the judgment of a lower court at San Antonio, which had enjoined the San Antonio Public Service Company from selling appliances. The effect of this decision has restored to the San Antonio company its right to merchandise appliances.

ful to the best interests of the people. The court held that, "It concerns the sale and distribution of articles which everyone would probably wish to possess. They are all useful and necessary to the equipment and furnishing of a modern home. The evidence showed these articles were being sold and distributed at a fair and reasonable retail price, and were installed without expense to the purchaser, and the use of any that were complicated was made plain to the purchaser; also old appliances were taken back in exchange at substantial prices. In none of these features can we discern anything detrimental to the welfare of the public."

### *Not an Attempt To Regulate*

The court held that "The act is not a fair or reasonable attempt to regulate public utilities, as that could readily have been done through the Public Service Commission, now the State Corporation Commission."

The court further held, "A monopoly is defined as the exclusive right, privilege or power of selling or purchasing a given commodity or a service in a given market. These plaintiffs have no exclusive right or privilege concerning the sale of these appliances. Any merchant or individual can sell them. The effect of the law is to create a monopoly rather than prevent one. The obvious result of the enactment, if upheld and enforced, would be to limit the sale of such appliances to merchants and others, whose present prices according to the testimony are as high as those of the plaintiff corporations."

In conclusion, the court, in its prevailing opinion said, "With no feature of public welfare actually involved, the conclusion surely must follow that to deprive these plaintiffs of an im-

plied power and privilege incidental to their general business, is unreasonable, arbitrary, unjust and oppressive. Other individuals, firms and corporations can engage in merchandising these appliances, but this particular class cannot. They are deprived the equal protection of the law. We therefore conclude that the Act is unconstitutional as being in violation of the 14th Amendment of the Constitution of the United States."

## William Judson Clark Passes Away Suddenly

**WILLIAM JUDSON CLARK**, vice-president of the Westchester Lighting Company, Mount Vernon, N. Y., and well-known to members of the American Gas Association, died suddenly June 4, in that city. Mr. Clark, a native of Bath, Me., was eighty-one years old and had been an executive of the Westchester company for thirty-one years.

Mr. Clark was active in American Gas Association affairs, a charter member and president of the Commercial Gas Association, and for years had served as honorary chairman of the A.G.A. Entertainment Committee. Before becoming associated with the Westchester company he had been general manager of the fuel and appliance department of the Consolidated Gas Company of New York, and had held other important positions with that company. He had devoted sixty-four years of his life to the two companies.

He was a member of the Rotary Club, the New Rochelle Chamber of Commerce, the Engineers Club of New York City, the New Rochelle Yacht Club and various electric light association clubs.

His son, Guy, Gayler Clark of Upper Montclair, N. J., and six grandchildren survive.

## John J. Burns Leaves Laclede Company

**JOHN J. BURNS**, for nine years investment manager for the Laclede Securities Company, St. Louis, Mo., has resigned from that position. He is a native St. Louisan and left high school to enter the employ of the old St. Louis Gas Company which was merged with the Laclede in 1890. He remained with The Laclede Gas Light Company until February 1, 1932, as head of various departments, serving as commercial manager for the last twenty-five years.

Mr. Burns is nationally known in the gas industry, having served as a member of the Advisory Council of the American Gas Association and for two years was chairman of the Commercial Section of the Association.

# Announce Nominations For Next Association Year



H. O. Caster

*To the Members of the American Gas Association:*

**A**NNOUNCEMENT is herewith made, in accordance with Section 2, Article II, By-laws of the Association, of the following report of the General Nominating Committee, for action at the Annual Convention in Chicago, September 26, 1933.

For President—H. O. Caster, Member Executive Committee, Henry L. Doherty & Co., New York, N. Y.

For Vice-President—P. S. Young, Vice-President, Public Service Electric & Gas Co., Newark, N. J.

For Treasurer—William J. Welsh, President, New York and Richmond Gas Co., Staten Island, N. Y.

For Directors—2-Year Terms:

H. C. Abell, President, National Power & Light Co., New Orleans, La.

Walter C. Beckjord, Vice-President and General Manager, Boston Consolidated Gas Co., Boston, Mass.

Howard Bruce, Chairman of the Board, Bartlett Hayward Co., Baltimore, Md.

J. S. DeHart, Jr., President, Isbell-Porter Co., Newark, N. J.

F. C. Freeman, President, Providence Gas Co., Providence, R. I.

R. W. Gallagher, President, The East Ohio Gas Co., Cleveland, Ohio.

C. N. Lauer, President, Philadelphia Gas Works Co., Philadelphia, Pa.

B. J. Mullaney, Vice-President, Peoples Gas Light & Coke Co., Chicago, Ill.

Herman Russell, President, Rochester Gas & Electric Corp., Rochester, N. Y.

Respectfully submitted,

ERNEST R. ACKER, *Chairman*

E. E. EYSENBACH

A. B. MACBETH

W. FRANK ROBERTS

W. A. SAUER

R. G. SOPER

General Nominating  
Committee

Following are the nominations made for section officers by the respective section nominating committees:

**Natural Gas Department:** For Chairman—Frank L. Chase, Vice-President, Lone Star Gas Company, Dallas, Texas; for Vice-Chairman—John B. Tonkin, Vice-President and General Manager, The Peoples Natural Gas Co., Pittsburgh, Pa.



P. S. Young



W. J. Welsh

**Accounting Section:** For Chairman—E. B. Nutt, Hope Natural Gas Co., Pittsburgh, Pa.; for Vice-Chairman—A. S. Corson, General Auditor, The United Gas Improvement Co., Philadelphia, Pa.

**Commercial Section:** For Chairman—N. T. Sellman, Director, Sales & Utilization, Consolidated Gas Co. of N. Y., New York City; for Vice-Chairman—F. M. Rosenkrans, New Business Manager, The Gas Service Co., Kansas City, Mo.

**Industrial Gas Section:** For Chairman—F. B. Jones, Director, Ind. Gas Sales, Equitable Gas Co., Pittsburgh, Pa.; for Vice-Chairman—J. F. Quinn, Supervisor, Industrial Sales Engineer, Brooklyn Union Gas Co., Brooklyn, N. Y.

**Manufacturers' Section:** For Chairman—John A. Fry, Vice-President and Secretary, Detroit-Michigan Stove Co., Detroit, Mich.; for Vice-Chairman, Appliance Division—J. Scott Fowler, President, The Lovekin Water Heater Co., Philadelphia, Pa.; for Vice-Chairman, Apparatus Division—Merrill N. Davis, Vice-President, S. R. Dresser Mfg. Co., Bradford, Pa.

**Publicity and Advertising Section:** For Chairman—Henry Obermeyer, Assistant to Vice-President, Consolidated Gas Co. of N. Y., New York, N. Y.; for Vice-Chairman—John F. Weedon, Superintendent, Advertising, The Peoples Gas Light & Coke Co., Chicago, Ill.

**Technical Section:** For Chairman—O. S. Hagerman, Engineer, American Light & Traction Co., Chicago, Ill.; for Vice-Chairman—C. A. Harrison, Gas Engineer, H. L. Doherty & Co., New York City.

September 26 has been officially designated as International Gas Industry Day at the Century of Progress Exposition, in honor of the International Gas Conference and Fifteenth Annual Convention of the American Gas Association.

## Nominated for A. G. A. Directorate



H. C. Abell



W. C. Beckjord



Howard Bruce



J. S. DeHart, Jr.



F. C. Freeman



R. W. Gallagher



C. N. Laner



B. J. Mullaney



Herman Russell

## Gas Engineers Graduate From Johns Hopkins

SIX technically trained gas engineers are ready for work in the gas field as a result of their graduation in June from the Johns Hopkins University, Baltimore, Md. They represent the sixth graduating class of the Gas Engineering Department of the university.

It has been said that the gas industry needs more college-trained men and these young men, with their scientific knowledge and fresh viewpoints, should prove welcome additions to the industry. Their graduation affords the gas companies an opportunity to augment their technically trained personnel with men who are thoroughly grounded in gas engineering.

In order to continue training men for the ranks of the industry, gas companies are being urged to establish scholarships in the Hopkins gas engineering courses to sustain the classes, depleted by graduates, in the fall of 1933. Scholarships are usually based upon an expenditure of \$450 per year. This sum covers the cost of tuition, books and incidentals.

For further information about establishing scholarships, communicate with Dr. Wilbert J. Huff, Professor of Gas Engineering, The Johns Hopkins University, Baltimore, Maryland, or the Educational Director of the Consolidated Gas Electric Light and Power Company of Baltimore, Baltimore, Maryland.

Those who graduated in June and their experience are as follows:

Martin Anderson Elliott—Bachelor of Engineering in Gas Engineering and Ph.D. in Gas Engineering—Experience: Consolidated Gas Electric Light and Power Company of Baltimore, summer of 1928 as laboratory assistant, and summers of 1929 and 1931 as superintendent's aide; summer of 1930, engaged in research under the direction of Dr. Lloyd Logan of the Department of Gas Engineering of The Johns Hopkins University in a study of the scientific and economic factors entering into the production and distribution of certain proposed gas mixtures.

John Bernhart Heinicke—Bachelor of Engineering Degree—Experience: Standard Gas Equipment Corp., summer of 1927; Consolidated Electric Light and Power Company of Baltimore as student electrical apprentice, 1929, test helper, 1930, summer work as test helper, 1931; summer of 1932—laborer with Bartlett-Hayward Company on construction of gas holder, Baltimore.

Albert John Pfitzing—Bachelor of Engineering Degree—Experience: Employed during the summer periods as follows: laborer, time clerk and street clerk, Union Gas and Electric Company, Cincinnati, Ohio, on main and service construction, street leaks, etc., 1929, 1930. Draftsman and street

clerk, 1931, 1932. During the Christmas vacation in December, 1930, two weeks at the East End Gas Works on minor construction work.

Thomas Lee Robey—Bachelor of Engineering Degree—Experience: Statistician with B. & O. Railroad, Baltimore, Md., 1928; stock clerk, sundry department, Peoples Drug Stores, Inc., Washington, D. C., 1929; valuable merchandise custodian and assistant foreman, sundry department, Peoples Drug Stores, Inc., Washington, D. C.

Harold Bruce Scharf—Bachelor of Engineering Degree—Experience: Employed during the summer periods as follows: The Cumberland and Allegheny Gas Co., Cumberland, Md., 1930; draftsman and assistant in general engineering work. The Manufacturers Light and Heat Co., Pittsburgh, Pa., 1931; material, time, and purchasing clerk on pipe line construction.

Stephen G. Moran—Bachelor of Engineering Degree—Experience: Employed during the summer months as follows: surveyor, Southern States Construction Co., 1926; pipe fitter, Traverse City Gas Co., Traverse City, Mich., 1927; pipe fitter, Canon City Gas Co., 1928; inspector of high pressure gas mains, Central Public Service Co., Rockford, Ill., 1929. Permanently employed as junior industrial representative by Consolidated Gas Electric Light and Power Co. of Baltimore, Baltimore, Md., 1930 to date.

# Model Gas Kitchen Increases Sales for Philadelphia Store

THE opening of a model gas kitchen in the house furnishings department of Strawbridge and Clothiers, one of Philadelphia's leading department stores, affords striking illustration of the methods now being employed by The Philadelphia Gas Works Company to expand the Quaker City market for modern gas appliances.

Significant is the event for two reasons: First, as an indication of the aggressive type of merchandising being done by the gas company, and second, as evidence of the growing appreciation by department store managers of the profits that lie in the gas appliance field.

While the department stores of Philadelphia, as in the majority of cities, have been selling the cheaper lines of gas stoves for years with varying success, it was rare to find a store that was farsighted enough to push the higher-priced, insulated and automatically regulated models. Rarer still was the department store buyer who could see any profit in gas refrigerators and other appliances.

But that was before sales officials of The Philadelphia Gas Works realized that if they were to withstand the onslaught of competitive fuels and hold on to their domestic load they must do two things—to build up consumer acceptance for a cooking appliance that could hold its own successfully against the finest equipment offered by the electric industry, and to increase the number of active retail outlets for all gas appliances.

Progress toward these objectives has been slow and sometimes exceedingly difficult. It necessitated heavy advertising and promotional expenditures at a time when most firms were slashing their budgets to the

**The Improvements in Utilities  
and Home Comforts Are as  
Amazing as the Low Prices**

**Tomorrow's an Event! Opening the  
Model Gas Kitchen**

Built to demonstrate the modern conveniences of gas! An entire new Kitchen designed by a woman who has spent years studying kitchen planning and management. In color, layout and equipment, this Kitchen presents the last word in pleasant efficiency. It contains:

**Metable Cabinet Work for Convenient Storage, Table, Working Space.**

**New Electrolux Refrigerator**  
—an amazing automatic Refrigerator, silent, air cooled, making cold from a tiny gas flame.

**New Automatic Gas Range**  
all-ivory porcelain on steel. An automatic clock turns gas on and off and an oven heat regulator—device that makes a science of cooking, saving much time and labor.

**Home Service Demonstrations**  
—a home service expert from the Philadelphia Gas Works Company will provide at the new Gas Kitchen, demonstrating. There will be table settings with appropriate cakes and refreshments for an afternoon bridge.

**Distinguished Newspaper and Magazine Writers Will Visit the Kitchen at 3 P. M. Thursday**

**You are cordially invited to inspect the new Model Gas Kitchen in the Housewares Department Fifth Floor.**



Philadelphia Department Store announces opening of Model Gas Kitchen with newspaper advertising display, part of which is shown here

bone. It called for months of the most relentless and painstaking effort to convince the dealer, both large and small, that he can make money by selling high-grade, up-to-date gas appliances and then showing him how to do it.

But today, with two of the three leading department stores of Philadelphia sponsoring complete gas-equipped kitchens and other dealers flocking to the colors at the rate of eight or ten each month,—38 full-line dealers have been opened up already this year—the gas company feels that it has achieved at least a modest degree of success in this direction.

Experienced merchandisers like Strawbridge and Clothiers and Gimbel Brothers had to be convinced that gas service and gas-burning appliances have not been outmoded. The current popularity of the new all-gas kitchens in both of these great stores and the gas appliance sales which have recently been reported by each seem to justify the decisions they made.

The Strawbridge and Clothier model kitchen was designed by a kitchen planning expert and installed by The Philadelphia Gas Works Company. With its compactly arranged cabinet finished in ivory and



*Model Gas Kitchen installed by Philadelphia Department Store, which has proven fine outlet for appliance sales*

tan, curtains and floor covering in blending shades, and conveniently located table-top gas range and gas refrigerator, this attractive kitchen is the ideal of modern efficiency and comfort.

Under the guiding hand of the gas company's home service representatives, two bridge tables were set up at the entrance to the kitchen on which were displayed sandwiches, cakes and all the accessories of a smart bridge tea. Cooking demonstrations also were conducted every afternoon during the opening week and complete recipes for the various dishes featured were distributed to visitors.

The opening of the model gas kitchen and a coincident sale of automatic gas ranges and gas refrigerators was heralded by the largest advertisements on this type of merchandise ever inserted by the Strawbridge and Clothier store. Approximately a half page of copy in each daily paper was devoted to the story of modern gas appliances.

This was supplemented by prominently displayed announcements in all regular newspaper advertisements of the gas company and by timely announcements every three or four days in the company's radio broadcasts from five Philadelphia stations.

Another feature of the promotion was an inspection of the kitchen on the opening day by a group of well-known women newspaper and magazine writers. Their visit was arranged by Miss Beatrice Wagner, home service director of the gas company, and resulted in considerable publicity for the kitchen.

Scenes change swiftly in the average large department store. Although the exhibit will be continued for an indefinite period, the model kitchen was actually a headliner for only a few days. But it accomplished what the store management had insisted upon and that was to bring traffic up to the house furnishings department, five floors above street level. And, incidentally, it was the drawing card that produced the biggest volume of gas range sales that Strawbridge's had enjoyed for a similar period in a long while.

### 83 Years of Continuous Service

On September 4, 1850, gas was turned on for the first time in the city of Chicago. The Peoples Gas Light and Coke Company's output was sufficient to supply 125 customers, the 99 street lamps and the lighting of the city's one public building.

Since then the city's population has been multiplied 118 times; the number of customers, over 6,000 times; the company's output, about 10,000 times. And from that September day in 1850 to this, the gas service has been continuous, every day and hour and minute; its continuity was unbroken even by the Great Fire of 1871.

Going to Chicago this summer? Be sure to visit Gas Industry Hall.



*View of another Model Kitchen sponsored by The Philadelphia Gas Works Company*

## ACCOUNTING SECTION

J. M. ROBERTS, Chairman

H. W. HARTMAN, Secretary

E. B. NUTT, Vice-Chairman

## Building Good Customer Relations

By C. Donlan

(Sponsored by Customers' Relations Committee)

**A**T a meeting of the Customers' Relations Committee in Chicago some years ago, a representative of one of the large eastern gas companies explained how his organization was endeavoring to improve its customer relations. He told in detail how service had been improved through the centralization of activities and how the comfort and convenience of its customers had been assured by equipping its district offices with period furniture, oriental rugs and soft lights.

A gentleman from the wide open spaces listened with a great deal of interest and apparent amusement and then explained that out where he came from it would be impossible to improve customer relations on this plan. In his district they had but relatively few customers scattered over a thousand square miles and centralization of service activities was out of the question. He also felt that they could not afford period furniture or oriental rugs and yet he claimed that his customer relations were as good as in any other sections of the country.

In view of such widely varying conditions, it is almost impossible to generalize about the subject of customer relations. A plan that may prove particularly desirable in one property may not prove at all satisfactory in another territory under different conditions. And yet, experience has shown that every successful customer relations program is based on certain fundamental considerations.

One of the most important of these is the attitude of the management towards its customers. If the chief executives of the company are imbued with a sincere, whole-hearted desire to render quality service to its customers, this attitude will permeate the entire organization from top to bottom, and be manifest in every activity of the company. It will be reflected in the actions of the clerks in the office, in the indexers and collectors in the field and, in fact, every one from the newest office boy up will respond to such leadership.

On the other hand, where the executives do not take a lively personal interest in the character of service rendered to their customers, careless and indifferent service is inevitable.

Aside from this fundamental consideration of executive leadership, there are many details which are responsible in a large degree for the success of any public relations program. These details may vary from one company to another, but based on our experience, we feel that the following factors have a marked influence on the relations between the company and its customers.

When customers visit the company office in person, their attention is first arrested by the show windows and if they are attractively arranged, displaying the latest appliances in a manner calculated to create sales appeal, the first step in creating that feeling of respect and confidence in the mind of the customer, so desirable to the company in their future transactions, is accomplished.

The sales room is the next contact made by the customer and this should be immaculate in appearance, the display of appliances featuring the best and most up to date on the market. Also a model kitchen, with a competent home service director in charge, should be on exhibition and in readiness to give practical demonstrations at intervals during the day. The floor sales force should be provided with flat top desks and with chairs for the accommodation of customers so that business may be transacted in a comfortable manner. The desks should be located in the front of the sales room and the sales people should be carefully selected, having in mind the importance of personality, appearance and knowledge of the business.

The Order and Application Division should be located toward the rear of the sales room, thus making it necessary for the customer to pass by a large portion of the appliances on display before contacting the employees in this division. Each order clerk should be seated at a flat top desk with a comfortable chair for the customer alongside of it.

Our experience has proven that women clerks are best adapted for this work, but caution must be exercised to see that they are carefully selected, have pleasing personalities, are presentable in appearance and thoroughly informed regarding the business, so that they will be able to answer any reasonable questions, thus avoiding the inconvenience to the customer of being referred to some one else for information that they should possess.

The Cashier's Department should also be located in the rear of the sales room for the same reason. Again our experience has proven that women are more desirable than men as cashiers and assistants. They should be thoroughly trained in their work and be cheerful and courteous at all times in contacting customers.

When customers contact the office by telephone, the calls should be handled by a Telephone Order Division in which

women operators are employed to take, record and draw the orders so received. It is very necessary that these employees have the "voice with the smile," that they have a good working knowledge of the business and, most important of all, that they be patient and courteous at all times and under all circumstances.

Too much thought and consideration cannot be given to the selection and training of special representatives, home service directors, salesmen, collectors and indexers. These are the outside contact employees of the company and by their actions the company is judged.

The special representative should be a man of long experience in the company. He must be tactful and present an appearance worthy of the company he represents. On him falls the responsibility of disposing of, by personal interview, the many misunderstandings that are bound to arise between the Company and the customer. Among these are particularly annoying high bill complaints, overdue accounts owed by prominent, influential and frequently very sensitive people. Also, he is the one who explains and offers the company's apologies for discrepancies and annoying irregularities that unfortunately do happen in the regular course of business. In fact, the special representative is one of the most direct and important factors in spreading the gospel of good public relations.

The Home Service Division has a great opportunity to promote the feeling of good will in the minds of the public through cooking lectures and demonstrations by home service directors in the schools, women's clubs, church lecture rooms and other places. The use of an educational bus so that school children can be reached in all localities served by the company and the service rendered by the home service directors in the houses of the customers all tend to improve public relations and advance the sale of our commodity.

It is very important that salesmen be thoroughly familiar with the goods they are expected to sell, that they are courteously persistent without giving offence, and that they possess those other qualities that distinguish the real salesman from the "order taker." They represent the company and should look the part. A favorable or unfavorable impression can be left behind them with the customer, and the Sales Supervisor should be ever vigilant to see that the company benefits by their contacts.

Collectors come in constant touch with the customer and are a valuable asset to the Credit Department in many ways other than the actual collecting of bills. They straighten out misunderstandings and are frequently

called upon to exercise rare tact and good judgment in the handling of orders to discontinue service for non-payment and in the amicable disposition of complaints of high bills, etc. A competent, reliable and pleasant dispositioned collector with a faculty for encouraging the respect and confidence of the customer is an employee of importance in the organization.

Neatly uniformed meter readers are no small contribution to the promotion of good customer relations. Patience, courtesy and accuracy on the part of these men must be productive of desirable results. As in the case of the collectors, they have a specific duty to perform, but are in a position to make friends for the company when adapted for the work and properly trained.

The work of the Customers' Service Division is another agency for the furtherance of good will that should not be lost sight of. These men, appropriately uniformed and carefully instructed in their work, can do much to solve the problems that arise occasionally in every household where gas service is available, and should be prepared to answer any reasonable inquiries regarding the service with cheerful courtesy.

Even the Department of Mains and Services can be of service in good will propaganda. The foreman on the job and the men in the ditch, by courteous intelligent relations with the public, should add their contribution to the cause.

Probably the beginning of most of the misunderstandings with the customer occur in the Bookkeeping Department. Every incorrect bill is a potential trouble maker. All bills, regular and final, should be sent out promptly and should be carefully audited before they leave the department. To minimize the possibilities of errors, the bookkeepers should be required to enter their tickets and keep the work up daily. The importance of neat, carefully kept, up-to-date consumers' accounts cannot be over-estimated.

The Credit Division should function in close harmony with the Bookkeeping Department and the responsibility for satisfactory relations with the customers rests with the Credit Clerk. He must be a man of discretion and tact. He must be thoroughly familiar with the territory covered and the class of customers residing in every part of it. Great care must be ex-

ercised in the sending of notices and the issuing of orders to discontinue service for non-payment. There is no company business, having to do with the customer, that requires the display of more good judgment and courteous perseverance than credit work.

Constant supervision of the activities cited above are, of course, necessary and the manager is the executive to whom this duty falls. He also supervises and disposes of all correspondence, one detail being the sending of a "welcome letter" to all new customers, signed by the manager personally. Also, he is the company representative in the community and, therefore, must be a person of some prominence, as his ability to serve the company is measured by his standing in the business and social world about him.

We trust that this summary of our practices in building good customer relations will prove interesting and instructive to others. We have always had a keen interest in learning of the practices of other companies and feel that much valuable information can be exchanged in this way to our mutual benefit.

## Account Designation Plan for Public Utility Companies

By C. W. Goris

Sponsored by the Customers' Accounting Committee

**A**CCOUNT Designation," as applied to utility customers accounting, is a means for identifying and filing the accounts of the company's customers.

Many of us can recall the time when such accounts were filed by the customer's last name, using a simple alphabetical plan. This was in the days of the small company, however, as the units grew larger, obviously the problem of designating accounts grew more complex and alphabetical plans became obsolete and new ideas were evolved from them.

The constant and repeated reference to customers' accounts is evidence of the importance of account designation. The file of addressograph plates must be kept up to date at all times. The more important reasons for reference to customers accounts are as follows:

- (a) Accounts must be placed in meter reading books in such an order as to facilitate efficiency in reading of the customer's meter.
- (b) Accounts must be billed regularly according to schedule.
- (c) Accounts must be posted with cash payments and other credits that accrue.
- (d) Accounts must be reviewed so that previous or unpaid bills can be transferred to the current bill.
- (e) Service to the customer concerning requests for duplicate bills and statements of accounts must be prompt.
- (f) Customers' orders for meter sets and turn-ons and for removes and shut-

offs, results of investigations, etc., must become a part of the customers' record.

- (g) Various inquiries from customers require that reference to accounts will produce a proper and immediate answer.
- (h) Deposit information must be properly recorded.

The number of systems of account designation that can be developed in the utility field is limited only by the ingenuity of the accountant. To be practical, however, any system of account designation must consider all the requirements, and provide for them. There are three major tests which should be applied to any plan of account designation, as follows:

1. Availability of each account. Can accounts be promptly located at all times?
2. Flexibility of the system. Is it elastic? Can additional accounts be added at any time without distorting the system or making extensive changes necessary?
3. Permanence of the system. If it has the element of flexibility it probably also has permanence.

Many will remember the time when account numbers had to be changed every few years because certain sections of a territory grew and the account designation

plan then in effect became inadequate. This involved expense in changing the sequence of accounts in the meter reading books and addressograph lists. The general confusion which takes place with such a change, we all know means trouble.

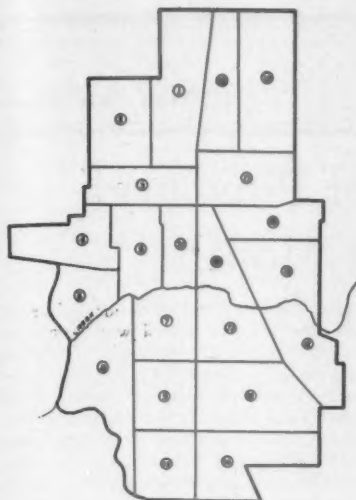
Rather than present a symposium of various systems of account designation, one system is described which is now in actual use. It is used by a company operating under about all the varied conditions a utility could possibly encounter. From one to four types of utility service are furnished in communities, ranging in size from good-sized cities, to suburban and rural territory. The units vary in size from 1,000 to 30,000 meters.

In this varied territory in designating accounts, provision must be made for:

1. Cities with street names and house numbers.
2. Suburban and rural towns not having street names or street numbers.
3. Distinctly rural territory outside of the cities and towns.

### 1. Designating City Accounts

Illustration No. 1 shows a typical city which has been segregated into "Districts" primarily for the purpose of obtaining efficiency in meter reading, delivery of bills and collections. As shown by the illustration, these districts are numbered consecutively. The district number then becomes the first or key number in the account designation plan, controlling the date



No. 1

Map of city showing districts and numbers assigned

the meters are read, bills prepared, also final discount date and collection activity.

Illustration No. 2, which is a group of city blocks within a district, shows how they are numbered. The arrows give an idea of the "round-the-block" plan of reading the meters which is in effect. This block number becomes the next number in the account designation plan.

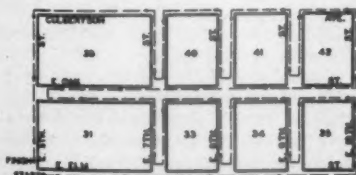
Illustration No. 3 shows the detail of city block No. 33 in District 15, indicating how the sides of each block are numbered. The sides of each block are numbered clockwise, beginning with one (1) for each block, as follows:

- North Side of Block is numbered—1
- East Side of Block is numbered—2
- South Side of Block is numbered—3
- West Side of Block is numbered—4

Since all of the accounts on one side of a block have the same district, block and side-of-block number, the street address then becomes a part of the account designation plan. The arrangement of the plate or stencil for a customer living at 708 E. Oak Street under this plan would be as shown in Illustration 4A.

## 2. Designating Suburban Accounts

District numbers are assigned in the series according to geographical layout or other conditions, and this becomes the



No. 2

Map showing city blocks within a district and how they are numbered

first number of the suburban account designation. An "R" is added after the district to designate rural.

Each town is assigned a number for identification purposes, and this number becomes the second part of the account designation.

Since many of these small communities do not have street names or numbers, the accounts are placed in the order of meter reading and are then numbered consecutively, making ample allowance for new accounts which may later come on between the present ones.

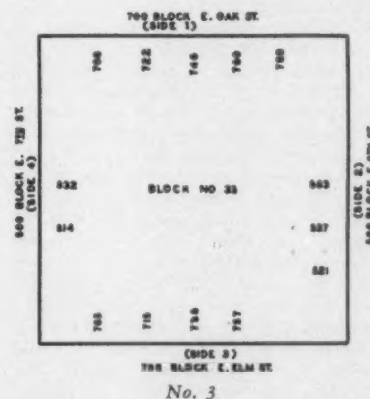
A typical suburban account plate or stencil would be as shown in Illustration 4B.

## 3. Designating Rural Accounts

The district number assigned is the same as that given the city or town to which it is adjacent, being suffixed with an "R" designating rural. This becomes the first number in the account designation plan.

The second number is the same as that assigned the town to which it is adjacent, suffixed with an "X" indicating rural service.

The meter reading sheets placed in meter reading order are numbered consecutively, and this number also becomes a



No. 3

Detail of block number 33 in city district 15

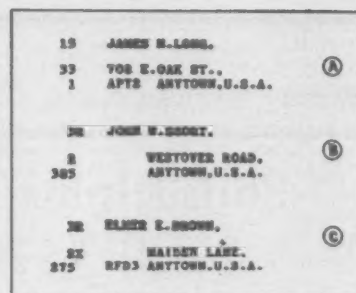
part of the plan. Proper provision is made for adding new accounts.

The plate or stencil arrangement of a rural account is as shown in Illustration 4C.

The addressograph plates and the meter reading sheets are arranged and the billing is done in account order, which automatically puts all customers accounting records in numerical sequence.

When it is necessary to refer to an account, the designation number of city accounts is obtained from a street index which shows the district, block and side of block for all streets and for each side of all blocks. The account designation of suburban and rural accounts is obtained from addressographed cards set up in alphabetical order by customers' names.

The plan of account designation described herein, as previously stated, is in



No. 4

Showing plate or stencil arrangement

actual operation. It has been found to be a most practical system and one which provides the features of permanency, flexibility and availability.

It was developed after a study had been made of many systems of account designation, and represents a composite of some of the ideas which the authors felt were best suited to the situation.

## General Accounting Committee Meets in St. Louis

A MEETING of the General Accounting Committee of the Accounting Section was held at the Statler Hotel, St. Louis, Mo., May 15, 1933, with the following members present:

M. F. Reeder, chairman; J. R. Abercrombie, Frank J. Bischoff, Jr., W. F. R. Munnich, S. B. Redmond, E. R. Rotramel, F. B. Saunders.

The meeting was called primarily for final consideration of the reports of the three subcommittees, and determining the nature of the material to be presented at the annual convention in September. The following subcommittee reports were submitted:

Internal Auditing Controls, E. R. Rotramel, chairman.

Carrying Charges on Idle Plant After Construction and Prior to Saturation, L. L. Dyer, chairman.

Preservation and Destruction of Records, F. B. Saunders, chairman.

Chairman Reeder pointed out that the time available for the discussion of the reports before the Convention would be somewhat limited, and asked the Subcommittee Chairmen to bear this in mind in preparing abstracts.

The members of the Committee were encouraged to contribute short articles on accounting subjects suitable for publication in the A. G. A. MONTHLY.

An up-to-the-minute treatment of the livable basement, a development of automatic gas house heating, is one of the outstanding attractions in Home Planning Hall at the Chicago World's Fair.

## COMMERCIAL SECTION

WALTER C. BECKJORD, Chairman

J. W. WEST, Jr., Secretary

N. T. SELLMAN, Vice-Chairman

## Philadelphia Company Utilities of Pittsburgh Sell 3,370 Radiant Heaters in Month

By Joseph McKinley

Vice-President in Charge of Sales,  
Equitable Gas Company

THE Equitable Gas Company, Pittsburgh, Pa., in common with other gas utility companies over the country, found itself confronted by sharply reduced revenues during the winter of 1932-33. The principal loss was traceable to a reduction in the use of gas in the residential heating field.

In an attempt to forestall further losses and to build new outlets for the use of heating equipment, a comprehensive program was worked out and adopted for the year 1933. This program followed two courses: First, the adoption of measures to retain present load and second, to build new load.

One of the provisions of the program called for an "All-Employee" campaign on the sale of radiant heaters for the month of March. During January and February, when plans were being worked out for this campaign, everything seemed unfavorable for reaching the objective of selling 2,500 heaters. With frequent bank closings, scarcity of money and the public panicky, conditions could not have been much worse. Moreover, radiant heaters had never before been campaigned on a large scale and there was no precedent to follow. The manner in which this campaign was put over to a successful conclusion should prove of interest to the gas industry generally.

The Equitable Gas Company is a subsidiary of the Philadelphia Company, Pittsburgh, as are also the Duquesne Light Company and the Pittsburgh Railways Company. These three companies and the general departments of the Philadelphia Company have been tied in on "All-Employee" campaigns about twice yearly for the past six years. In all, there are about 8,500 employees.

Previous general campaigns had centered on the sale of some electrical item, since the light company serves the entire Pittsburgh district while the gas company is one of three gas utilities serving Greater Pittsburgh. Furthermore, no gas appliance of importance as a load builder had been available at a price under \$10. Experience has shown that a campaign item must be a genuine value and, for largest unit sales, must sell under that figure.

With conditions what they were, it was recognized that extraordinary methods would be necessary in order to, in any way, be of help in the face of declining revenues. The use of gas needed to

be repopularized and equipment sales were required in large volume.

The general plan of the campaign finally determined upon was to organize the several subsidiaries of the Philadelphia Company into six "Army Divisions" for the figurative purpose of recapturing forty gas wells in the West Virginia territory which had been put out of commission as a result of competitive influences. Each of the six divisions was assigned a part of the gas well territory to be regained and its proportionate share of wells to recapture. The method of recapturing the territory and wells was by direct selling of radiant heaters to customers or by turning over the names of prospects on any type of gas appliance to the sales department for closing. Each direct sale or prospect sale counted a certain number of points equivalent to the load building value of the appliance sold. Each 100,000 points captured a well. A large "War Map" score-board pictured the progress graphically.

It was decided that all prospects for gas equipment which were received during January, February and March and which resulted in sales prior to April 30, would count toward prizes and special load building bonuses announced in connection with the March radiant heater activity. Thus, the prospect campaign extended through three months while the radiant heater campaign was scheduled for March only. The time limit for heater sales and equipment prospects was extended until April 8, however, to compensate for the set back received by the bank holiday during March.

From January 10 on, numerous letters, posters on bulletin boards, articles and advertising in *Public Service*, the company magazine, and group meetings kept the employee personnel interested in the campaign. Employees were taken into complete confidence regarding the seriousness of the declining revenues and a great many of them earnestly set to work to do their bit, just as during the war.

The effect of organizing the Philadelphia Company into Army Divisions was to bring all officers and executives of all companies into direct responsibility for the success of the campaign. At employee

"pep" meetings, the superior officer of the employees assembled was almost invariably present and thorough cooperation was urged. This move resulted in a larger number of employees who tried to make sales and a record number of employees who succeeded in making sales, although radiant heaters were the most difficult item ever campaigned within the experience of the company.

Hardly had the radiant heater phase of the campaign begun than it received a serious set back by the closing of all banks. At that time it was generally felt that results would be disappointing. However, such a fighting spirit had been engendered that during the week the banks were closed, over 300 heaters were sold and as soon as the banks reopened, sales mounted to well over 100 a day.

In addition to calling for the support of officers of all branches of the utility organization, another innovation, at least to the Philadelphia Company, was called into play. The names of 100,000 gas customers in selected districts were run off on prospect cards which were, in turn, distributed to the various "Army Divisions." Each employee who was willing and suited to solicitation was then given any desired number of cards. The advantages of having these cards were that employees were enabled to call customers by name, important gas customers were contacted and customers of the Equitable Gas Company could be located in districts where more than one gas company served.

While there is no accurate record, it is estimated that about 75,000 calls were made. A record-breaking number of prospects were received, the number being 1,244, all of which had been pretty well qualified before being turned over to the sales department. In campaign literature it was stressed that the number of salesmen was limited and that unless employees were reasonably sure customers were prospects, the campaign would be seriously handicapped by receiving the names of non-qualified prospects.

A total of 141 sales were made as a result of prospects received during the campaign which included 34 automatic water heaters, 67 gas ranges, 35 radiant heaters—other types than that campaigned—3 gas heating boilers, 1 non-automatic conversion burner and 1 automatic conversion burner. There remains a very fine prospect list on all types of

gas equipment which will undoubtedly lead to many sales as time goes on.

The complete mailing piece to employees prior to the opening of the March campaign which was known as the "Gas Sales Offensive," included

1. A twelve-page booklet, well illustrated with drawings, sketches and cartoons of a war-like character.
2. A sales broadside giving a large picture of the radiant heater featured, together with prices, terms and other information necessary in order to complete sales. The inside pages of this broadside give pictures and descriptions of other types of gas equipment to be of assistance to employees in securing prospects on other gas equipment.
3. A folder provided by the Adams Bros. Manufacturing Co. of Pittsburgh, whose heater was featured, for use in selling other heaters of the Adams line on which special campaign prices were arranged.
4. Order forms for selling heaters to customers.
5. Order forms for purchasing heaters at special employee prices. (Limited to two.)
6. Prospect cards.
7. Discount card for use of employees in purchasing gas appliances other than radiant heaters.

The total figures of the entire activity are of interest. The original objective of the campaign was to add \$35,000 annual revenue through the sale of gas equipment of all kinds during January, February and March, 1933. This objective was nearly reached, the final results showing an estimated added annual revenue of \$32,360 and a replacement revenue of \$7,744. It cannot be said that this load was secured in the manner originally planned since the number of sales of central heating equipment as a result of prospects was quite disappointing. However, the sale of radiant heaters exceeded expectations and one large industrial heating project secured was not anticipated. Since the sale of water heaters and ranges was about as anticipated, these two factors were responsible for almost reaching the objective set.

The total value of sales reach \$98,225 made up from the sale of the following items:

Radiant heaters, 3,370; ranges, 426; laundry dryers, 1; automatic water heaters, 74; conversion burners, 15; gas heating boilers, 15; house heating furnaces, 7; circulating heaters, 4; unit heaters, 41; miscellaneous items, 35.

Most of the campaign publicity was directed toward arousing and maintaining the interest of employees. Nevertheless, the campaign was well backed with newspaper advertising, advertising on gas bills, service programs four times daily

over radio station KDKA, and by quite elaborate window displays in the twelve gas and electric shops which serve the Equitable Gas Company.

All installation of heaters was handled by the Appliance Service Department of the gas company, the delivery and installation expense being included in the purchase price of the heater. It was decided that the company should do the installing in order to make sure that no heaters were placed in quarters too closely confined, that solid connections were made to both gas line and to the flue, and that heaters were properly adjusted for maximum service. For a period of about three weeks, nine trucks were kept busy delivering radiant heaters.

An interesting sidelight of the heater campaign was the speed attained in converting pig iron into heaters and then into actual use in customers' homes. While a bogey of 2,500 heater sales had been set up, few were willing to concede that any such number would be sold and, of course, the original orders did not call for any such number. When daily sales totals reached and surpassed 100, it became evident to the Adams Bros. Manufacturing Co. that a production problem would have to be solved. Clay back manufacturers were working only about two days a week and iron castings manufacturers three days a week with limited outputs in each case. Within a short space of time, the Adams Company succeeded in speeding up production and assembly of heaters to a point where the castings of the heaters might be pig iron at 1:30 P.M. one day and the installed heaters in use in customers' homes by 5:00 P.M. the following day.

A dealer tie-in was arranged for. The manner in which contacts with dealers were established was through the Pittsburgh Retail Hardware Dealers Association which sponsored that phase of the campaign. F. A. Hegner, president of this association, called together the leading hardware jobbers, told them of the plans for an employee campaign and presented the proposal of the gas company for the assignment of leases for time payment radiant heater sales by dealers. One of the regular meetings of the Hardware association was turned over to a discussion of the room heater activity. Dealers were permitted to sell any approved room heater retailing at a price above \$7.45 on a time-payment basis for assignment to the gas company for prompt reimbursement. Payments were included on gas bills.

Cash prizes totaling \$50 were offered on the basis of the largest number of radiant heater sales secured by the four leading dealers. A prospectus covering the details of the dealer activity, along with application form, sales report slips, order forms and window streamers, were mailed to hardware dealers. Sales were restricted to the lines of the Equitable Gas Company. Supporting this phase of the

campaign was a cooperative ad on the March gas bill and cooperative advertising in all of the Pittsburgh newspapers and in suburban papers covering some fifty different boroughs and towns.

It may be said that the dealers were not enthusiastic about campaigning room heaters during a Spring month. Their room heater business has always been in the Fall. It may also be said that the employee campaign was successful only because people were contacted through solicitation in their own homes. Sales of heaters where customers came into a store to buy were few and, for this reason, the volume of sales from hardware dealers was not large. No figure on dealer sales can be given because many dealers did not report the number of their sales to the Hardware association.

Still another tie-in was to arrange for heating contractors to assign heating equipment sales leases to the gas company. Manufacturers representatives of gas equipment were first contacted before this offer was made, since most of the selling of gas equipment is done by salesmen representing the manufacturers' representatives. Such sales, of course, clear through the heating contractor.

The sale of 3,370 heaters during the worst month of the depression may be attributed for the most part to the absolute determination of hundreds of employees to sell heaters without regard for obstacles of any sort or description. The employees of the gas company took this attitude from the very start and were first to show that heaters could be sold in volume. Other units, which had been using tactics which were successful in former campaigns but of little avail in the heater campaign, quickly adopted the frame of mind of the gas company group and decided to do everything, regardless of what it might take, in order to close sales and uncover prospects.

### Supervises All Displays of Consolidated Gas Co.



R. M. Martin

THE display studio of the Consolidated Gas Company of New York, under the direction of Raymond M. Martin, is now supervising poster and window display activities of electric companies affiliated with the Consolidated Gas Company System, as well as of the gas companies.

This follows the recent centralization of gas and electric advertising.

Mr. Martin has been in charge of the gas companies' display work for eleven years. He originated a type of window advertising widely used by the utility companies.

## HOME SERVICE COMMITTEE

RUTH KLEINMAIER, Chairman

JESSIE McQUEEN, Secretary

## Home Service in a Modernistic Setting



Margaret Nevins

THE new Service Center building of the Syracuse Lighting Company, Syracuse, N. Y., has given home service a most attractive auditorium and group of offices in which to carry on its work. The entire building is in a modernistic design and so home

service in this company falls heir to such unusual equipment as aluminum chairs set in an artistic effect, which includes aluminum trimming and Chinese red design combined with black vitrolite panels. Following is a description of this home service department together with the program of work by Miss Margaret Nevins, director in charge:



Home service kitchen of Syracuse Lighting Company, Syracuse, N. Y.

"The entrance doors along one of the long sides of the rectangular room are of metal, with striped patterns of crimson and yellow. Fluted columns of crimson woodwork are spaced along the side

walls. Recessed in the other side of the room are three large alcoves, rooms in themselves, with the open sides toward the auditorium. As with the kitchen in front, these can be brilliantly lighted to focus interest on one area. There are no windows in the room, which is below the street level. Lighting and ventilation are subject to exact control.

"The ceiling of the room is as distinctive as the walls, for a very practical reason. It is the source of the concealed lighting that, unseen to the audience, illuminates the kitchen or lightens the whole auditorium at the will of the demonstrators. The ceiling is a series of 'steps' extending from the back of the room to the front. The face of each step points toward the stage, and extends the width of the room. Sunk flush in these faces are long bars of light which concentrate the illumination toward the front of the room, but can be raised to sufficient intensity to light the entire auditorium by indirect light.

"The kitchen occupies the stage which extends across the full width of the room. The woodwork and cabinets are finished in aluminum and crimson instead of the usual white. Gleaming black vitrolite panels at each side form a striking background for the modern colored appliances.

"The first view of the department is startling. Here is something out of the ordinary, and we can expect a program that will be as advanced and interesting as the surroundings themselves, is the average reaction of the woman visitor. Just as the design of the whole building bespeaks a new era of the use of gas service, so does the home service department boldly symbolize a new deal in home life.

"In this stimulating setting, over 1,400



"Backstage" food preparation kitchen, Syracuse Lighting Company, Syracuse, N. Y.

women gather each week for classes in homemaking. With no more advertising than a personal letter sent out when the project was started, the classes have doubled and tripled and are increasing with each session. Classes are held on two afternoons each week and one evening for the general public and a special five o'clock class on Mondays for women employees. In the first year, over 3,000 women have enrolled.

"The housewives of Syracuse come, and return with their friends, because the programs are as interesting as is the setting in which they are presented. From the start, our staff has avoided the limitations of the 'cooking school.' Gas cooking and the use of modern kitchen appliances form the basis of the course, the home lighting, interior decoration, table setting, home entertainment and other subjects are included.

"The design and equipment of the department permits this change of theme. Each of the three large alcove rooms along the side is furnished as a working model—one as a child's nursery, another as a living room and a third as a basement game room with its gas furnace and automatic gas water heater. Wall paper, furniture and lights have been carefully selected for practical demonstrations in home lighting. The appliance room, with its laundry driers, ironers and other equipment, never fails to attract immediate interest.

"Each week's program is carefully rehearsed. Recipes are tested and a large amount of research work done in anticipation of the many questions that will be asked. More often than not while the demonstration of one meal is going forward, a duplicate is actually cooking in the oven, so that the women may see for themselves the ultimate results of the demonstrator's methods.

"The floor of the hall does not slope like that of a theatre, so a clever device is used to make every operation visible to everyone in the audience. A large rectangular mirror is placed at a slight angle over the demonstration table. In this mirror, spectators can follow every movement of the lecturer's hands, and even look into the bowls and containers. Spectators have a 'cook's-eye' view of all that is going on.

"Each woman enrolled is given a leather-covered loose-leaf notebook in which she can file printed recipes if she chooses. These recipes are printed in an attractive and uniform style on perforated pages so that each may be removed for filing under the proper classification.

"Backstage' of the kitchen consists of an adjacent food preparation and testing room and the offices of the director and staff. These are easily accessible from either the auditorium or the entrance foyer.

"The activities of the department are by no means concentrated on the homemaking classes, of course. There is the usual routine of duties in assisting housewives in the use of gas appliances. An interesting development of the department's activities has been the increasing requests from home economics classes in schools and nearby colleges for talks and demonstrations.

"An average of 250 inquiries a week by phone or in person are received from housewives seeking information on anything from how to design a complete model kitchen to the proportion of flour in a chicken pie.

"Directed from the Syracuse office, a number of rural homemaking classes have been started in nearby towns. Modeled after the Syracuse programs, they have been equally successful in drawing large numbers of women where there had been no interest or enthusiasm before.

"The results of the 'new deal' in home service go farther than the visible enthusiasm of the hundreds of women who come to the utility building each week to learn what gas appliances can do in their homes. There is the far-reaching effect on local merchants. The Syracuse Company does not sell appliances. Its sales floors form a continuous exhibit of appliances sold by local merchants, and the period after each home-making session is a gala review of such exhibits."

## Convention Calendar

### July

10-28 Household Appliance Course  
Columbia University, New York,  
N. Y.

### September

11-16 American Chemical Society  
Chicago, Ill.

13-15 Pacific Coast Gas Association  
Ambassador Hotel, Los Angeles,  
Calif.

18-19 Canadian Gas Association  
Ottawa, Ontario

### October

18-20 American Transit Association  
Stevens Hotel, Chicago, Ill.

25-29 International Gas Conference and Fifteenth Annual Convention, American Gas Association  
Stevens Hotel, Chicago, Ill.

25-27 British Commercial Gas Association  
Bournemouth, England

Wk. 11 National Association of Railroad & Utilities Commissioners  
Cincinnati, Ohio

24-26 American Petroleum Institute  
Chicago, Ill.

## Pennsylvania Natural Gas Men's Association



F. F. Schauer

**THIRTY-SIX** members of the Pennsylvania Natural Gas Men's Association played golf June 5, at the Wildwood Country Club, near Pittsburgh, and enjoyed a lively contest.

The "Kickers Handicap" prize was won by George E. Welker, president of United Natural

Gas Company, Oil City. The low gross prize was awarded by lot through drawings from the five lowest scorers and went to H. H. Pigott, assistant land agent, Equitable Gas Company. The high gross, or consolation prize, went to R. A. Beach, of T. W. Phillips Oil and Gas Company, Butler, as the lucky drawer from the five highest scores.

Motion pictures of last year's golf party were shown also a United States Bureau of Mines picture of the story of a Mexican oil gusher which was of genuine interest.

The dinner and annual meeting of the association was attended by more than sixty members and guests. The following were welcomed as new members of the association during the past year: B. H. Gardner, R. E. Polk, L. W. Heath, F. M. Sloan,

Samuel J. Brendel, Frank M. Brewster and J. F. Davis.

The following were elected directors for the new association year: T. B. Gregory, G. W. Harr, S. W. Meals, B. D. Phillips, F. R. Phillips, George W. Ratcliffe, J. F. Robinson, F. F. Schauer, J. B. Tonkin, George E. Welker and George Wittmer.

The directors elected officers as follows:

F. F. Schauer, president; G. W. Harr, vice-president; and B. H. Smyers, Jr., secretary-treasurer.

## Appliance Course to Open at Columbia University

**T**HE summer session course on Household Appliances at Columbia University will be held this year in New York City under the direction of Dr. C. J. Lynde. The first three weeks, July 10 to 28, will be devoted to the study of gas appliances and during this course Dr. Lynde will be given the cooperation of the American Gas Association as has been done for the past eight years. Particular assistance, especially in the Laboratory, will be given again by T. H. Schleuning, engineer of the Consolidated Gas Company of New York. This is a three weeks' course for which academic credit is given by the University.

The Century of Progress International Exposition is 98 per cent gas heated. Prepared food served in restaurants and elsewhere on the grounds is 100 per cent gas cooked.

## INDUSTRIAL GAS SECTION

E. L. WILDER, Chairman

C. W. BERGHORN, Secretary

F. B. JONES, Vice-Chairman

# The Competitive Situation in Commercial Sales\*

By G. W. Turner

Equitable Gas Company, Pittsburgh, Pa.

THE coal stoker, a mechanical means of burning coal in boilers, has been in use for many years on the larger boiler units. We are all familiar with the great economies of fuel, labor, and overall operating expenses that the mechanical stoker brought about in the power plant field. Bearing these improvements in mind, it is not illogical to acknowledge the possibilities of decided improvements in the burning of coal in smaller amounts under smaller boilers.

The development of the coal stoker, contrary to the development of many mechanical devices, began with the large units and has been developing to include the smaller units ever since.<sup>1</sup> It is only about ten years ago that a reasonably satisfactory mechanical stoker was available for the firing of boilers and furnaces in homes and other small buildings. For several years the use of the coal stoker for these applications was very largely confined to utilizing only anthracite coal, which we all know is easier to handle during the process of combustion than bituminous coal.

About five years ago, a number of stoker builders began to actively and intensively experiment with small mechanical stokers for burning bituminous coal of ordinary commercial quality. I think the natural gas industry was at first somewhat inclined to ignore these developments, implying that such a small stoker for bituminous coal would never be practical and would give more trouble to the owner than it was worth. The records show that the first bituminous coal stokers did have many unsatisfactory characteristics, but the past few years have brought about marked improvements in the operating characteristics of these small mechanical bituminous coal burning stokers. The latest information which could be obtained concerning the manufacturers of stokers, will, I believe, well illustrate the activity in this development. There are 91 companies manufacturing stokers of some type, of which 84 are for bituminous and 7 for anthracite coal. Thirty-six companies manufacture stokers of one type only. Of these, 6 make large sizes only for power or industrial plants; 12 manufacture the commercial size only, and 28 manufacture domestic only, of which 7 use anthracite coal and 21 are for the burning of bituminous coal.

Forty-four companies manufacture stokers for two or more fields, of which 22

companies are placing on the market stokers for the largest power stations down to the smallest commercial size boiler plants; 12 build both commercial and domestic sizes, and 8 build stokers for the whole range of field of stoker requirements.

To consider the stoker field in another way, the interested party may choose his stoker for his large power plant, from 36 companies. The small manufacturer or apartment house owner has his choice of 57 makes of commercial stokers, and the home owner may choose from 47 domestic stokers.

## Competitive Fields

Now, what are the applications for the bituminous coal burning stoker that are causing concern, particularly to the natural gas men? There are two principal fields that stand out as being particularly important at this time; namely, first, small steam or water boilers commonly used for heating homes and commercial buildings, together with the auxiliary heat exchangers for heating water; and second, bread baking ovens that have fire boxes suitable for the hand-firing of bituminous coal.

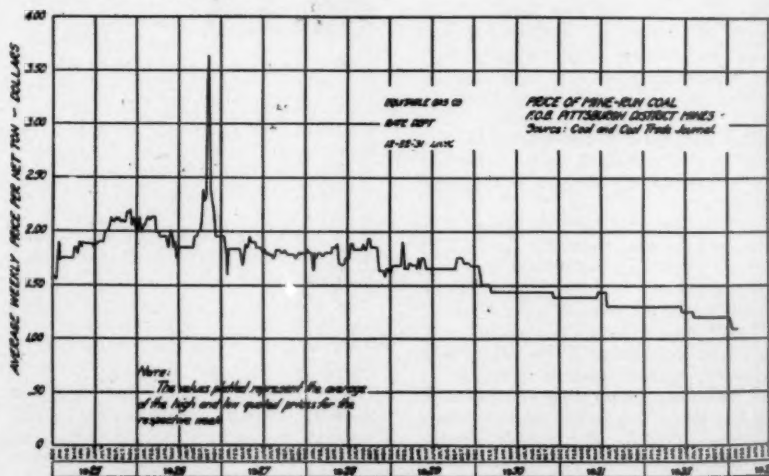
An analytical review of the load of any of the natural gas distributing companies in the Pittsburgh district, will doubtless show that these two fields of application for

the coal stoker are also fields wherein considerable quantities of gas are used. Some approximate figures on the percentages of the total load of natural gas companies in this district that these fields represent would probably not be out of place. For example, it has been shown by analysis that about 10 per cent of the total gas sales for all purposes is sold to customers for building heating purposes and utilized in gas or steam boilers where there is no particular mechanical reason why the small mechanical stoker could not be used. There is also an additional  $3\frac{1}{2}$  per cent utilized in large volume water heating systems that could be replaced with heat exchangers in case stokers were used for building heating purposes.

I think it is safe to say that 3 per cent to 5 per cent of our total gas sales is sold to bakeries for bread baking purposes in commercial quantities. Of this figure, surveys have indicated that one-fourth of the total bakery load is also subject to competition from stokers.

Summing up, it is evident then that from at least 12 per cent to 15 per cent of the total send-out of natural gas companies in the Pittsburgh territory is subject to competition from these mechanical devices. It seems to me that these figures are ample reason why the natural gas man should be intensely interested in the development of the small coal stoker.

In all of these fields that I have mentioned, and in the building heating field



Price of Run-of-Mine Coal F.O.B., Pittsburgh, Pa.

\* Address before Eastern Natural Gas Regional Sales Conference, Pittsburgh, Pa., March 3, 1933.

particularly, a large portion of our future or potential load exists. In other words, these are the fields from which we had formerly expected to secure new loads in order to increase our gas send-out or to replace load on our lines that is lost for various reasons. This, then, constitutes another good reason why the natural gas man should be interested in these stokers.

#### *Selling Methods of the Stoker People*

Before we consider some of the selling methods which the stoker people have been following, I think it would be of benefit to our cause to admit and realize that the past three years of strained economic conditions have afforded a most favorable opportunity to the stoker people to introduce their devices and to secure a rapid public acceptance. Also, in following out our determination to face the facts in regard to this matter, we must recognize that the stoker people have used considerable intelligence in promoting their equipment and have been quick to recognize opportunities that the economic conditions provided and to act promptly on these opportunities.

As a result, a number of units of their equipment have been sold in this district, and the gas companies have suffered a considerable drop in revenue from this source.

According to our experience, the appeal of the salesman for coal stokers can be divided into five distinct parts which I will describe in the order in which the salesman usually presents them to good gas customers:

#### *1. Savings Basis:*

Anybody these days who can approach a hard-pressed home owner, building operator, or bakery manager, and start talking about savings in their gas bills, is likely to get a hearing. Hence we find the stoker people use the savings in gas bills as an entrée to get a hearing. Naturally the appeal of overall savings of anywhere from 50 per cent to 75 per cent of the present gas user's gas bill, in these days should attract anybody's attention. There are many examples of recent advertisements in which these savings are claimed. Not only are these savings claimed in advertisements, but they are also made in radio talks over the local radio stations and are freely made by the salesmen for this type of equipment.

#### *2. Claim of Automatic Heat:*

After a talk of saving our good gas customer money on his fuel bill, the stoker salesman gets attention and then he begins to claim complete automatic operation for his equipment, comparable to the best gas job. He points to automatic pressure control on a steam boiler, which starts and stops the stoker according to steam demand, or points to the push button control of the stoker which may be operated from the front of the bake oven in case of the bakery application.

#### *3. Concentration on Comparative Fuel Costs:*

It is to the stoker salesman's advantage to call the prospective customer's attention to the large difference between gas bills

and the cost of coal for any particular application. Following out our determination to face the facts, we know that in many appliances as bake ovens and boilers, the cost for coal alone actually runs from only 20 per cent to 40 per cent of the natural gas bill. In comparing these relative initial fuel costs of gas and coal, we must recognize that the level of coal prices in this district today is very low, and is only approximately 50 per cent to 60 per cent of that prevailing back in the years 1927-1929. The chart illustrates the variations in coal prices in the Pittsburgh district for the past seven years. In all probability, the price of coal will increase in the future in this district, but as to when and to what extent, it would in my opinion, be hazardous to guess. The fact that should interest us is that the average boiler user and bakery operator is not much concerned about the possibility of increased coal prices. Hence, this is a condition that we must also face.

#### *4. Long-Term Time Payments Based on Difference in Cost of Gas Bills and Coal Bills:*

After the stoker salesman has progressed to this extent with his prospect, and has no doubt, as experience has proven to be true, greatly aroused the interest of the customer in the possibility of a saving in his fuel bill, he is ready to point out to the customer that he can pay for the stoker installation with an outlay of money per month that is less than the difference in the first cost of the coal and gas bills which he has just pointed out. We must give the stoker man credit for being shrewd enough to set his monthly payments for the stoker installation at an amount on any particular installation, that is just about equal to the difference between the cost of the coal and gas bills.

It so works out in many cases that the stoker salesman can assure the prospect that in a period of 18 months or two years the installation will be paid for out of savings and from then on he will own the stoker and can realize the savings, and thereby add to his net profits. To a harassed building operator or a hard-pressed bakery manager, or the economy-slanted gas heated home owner, we must realize that this type of argument is very alluring in these times.

The stoker salesman now can probably safely advance the argument that since the stokers will be completely paid for out of the savings in fuel bills, there will be no fixed charges on the stoker installation as far as the particular customer's accounting set-up is concerned. And to our amazement we have found a large number of customers who have accepted this type of argument.

#### *5. Associated Items of Heating Costs are Ignored and Minimized:*

At this stage in the negotiations of the stoker salesman, he is ready to become bold and usually refers to the fact that there is some labor involved in shoveling coal into the stoker coal hopper. However, he seldom alludes to the fact that some hard and hot manual labor will be required with a

slice bar to break up the stoker clinkers. He is now ready to disclose another theory to the customer; that his labor does not cost him anything as his janitor, bread baker, even office boy or housemaid can go down into the basement or behind the bake oven every few hours and shovel on a few shovelfuls of coal without any appearance of additional labor charges on his payroll.

We must admit that in some cases this is true, namely, that no additional labor charges would be shown on the customer's cost accounting. Nevertheless, we cannot help but realize that the time any individual spends in shoveling coal, breaking up clinkers, putting ashes in the refuse cans, detracts a definite amount of time from the performance of other duties which a particular individual has been assigned to do. It may be true in some cases that the baker's or janitor's time is not completely occupied with other duties. In this case there is some support for the stoker man's argument. Similarly, there may be times when the janitor of the building cannot neglect the cleaning of windows, sweeping and scrubbing of halls, shoveling of snow from the sidewalk, to give attention to the stoker.

#### *Comparative Gas and Coal Heating Costs*

It is perfectly obvious when one considers the relative local prices of bituminous coal for domestic and commercial purposes, and of natural gas, that natural gas cannot compete with bituminous coal on an equivalent B.t.u. first cost basis. But history of the gas and coal prices in this territory has shown that it has never been necessary for the cost of B.t.u.'s in the form of natural gas and coal to be the same in order for natural gas to secure and retain a reasonable portion of the total domestic and commercial load available. The spread between the first cost of gas and coal naturally must be made up of additional items chargeable to coal operation if the two fuels are to be put on a comparative economic basis.

This has been more clearly recognized by the manufactured gas industry, and they have been selling gas for house-heating and commercial purposes without attempting to compare the cost of B.t.u.'s in gas to the B.t.u.'s in coal, and they have always insisted that there are certain credits in favor of gas operation and charges against coal. They have continually proclaimed these facts to their customers and the encouraging thing is that they have been successful to a marked degree in having the customers accept this method of comparing gas and coal costs.

Now it is not reasonable to think that the value of cleanliness, automatic operation, flexibility, is worth any more in New York City or Chicago than it is in Pittsburgh or any other territory served with natural gas. The problem then is that the public and the customers in natural gas territories must be taught by the gas companies to look at this fuel matter in the same way as they do in these other districts.

Our immediate problem, therefore, is to clearly state the advantages of automatic gas heating, whether for in the home, the

office building, or for the bakery, and proclaim these facts frequently enough, loudly enough, and interestingly enough so that our customers will see and admit their existence.

In addition to proclaiming the facts of automatic gas heating, I believe we have the additional problem of presenting the true comparison of the total cost of automatic gas heat as compared to stoker fired coal heat. We all know that a fuel cost comparison only does not present the true comparison, yet many of our customers are led to believe that this is practically the case.

Now let us throw a little light on this problem from the point of view of comparative total costs. We have prepared a number of comparisons between gas and coal stoker operation on different types of applications, which show the analyzed results both from the point of view of comparing, first, fuel cost only, and second, total heating costs including all of the reasonable charges to coal. These comparative costs are illustrated in Tables 1, 2, 3 and 4.

Obviously, those interested in an activity will be prejudiced, but in preparing this paper as mentioned before, it was with a determination to face facts and I hope that I will not be considered as being prejudiced if I comment on the claims of the stoker people which I believe are misrepresented or biased. We believe that the items in the comparative charts are legitimate charges. As mentioned before, the stoker people disregard many of them and others they distort. We have found in many cases that the gas bills upon which they base their guarantees are billings for gas used for cooking and water heating in addition to the gas used for heating, when heating is the only operation that they contemplate replacing. Comment has already been made regarding the minimizing of fixed charges and the amount and allocation of labor charge.

In claiming automatic heat control, it is true that stokers can be made to start and stop automatically in accordance with the variation of steam demand or water temperature, but this control is true only so long as the stoker is supplied with the proper coal and does not have the combustion chamber clogged with excess ashes or clinkers, or as long as the coal does not contain hard foreign matter which either shears the drive fan or throws out the clutch. Even under the most favorable conditions with outside temperatures of over 40° F., the tendency is to overheat due to the minimum feed necessary to maintain the fire. Power cost is an item admitted but generally minimized. Tests conducted at Purdue University show the power requirements to average 10 kw.hr. per ton of coal fired.

Claim is also made by stoker manufacturers that the lowest grade of coal may be used. We know of cases where low grade coal gave unsatisfactory results such as smoking and excess clinkering, necessitating the purchase of a better, higher priced coal. The coal companies are at variance with

the stoker people in this respect and state that a good grade of stoker coal is necessary for good results.

Although some may question sales tactics that criticize the product of a competitor, it is to present a true picture to our customers rather than a criticism and we are pleased to report that we have been partially successful in holding the load by such a presentation.

Historians have often said that it takes a great occasion to produce a great speaker and a great speech. Applying this to the present situation, we can say that severe competition calls for heroic sales efforts and unusual publicity policies. Before we go any further into consideration of the question of what can or should we do about this situation, I think we should recognize that this competition is not an exclusive by-product of the present business conditions. Had the prosperous days of 1928 and 1929 continued on uninterrupted to the year 1932, I think it is undoubtedly true that we would have experienced this threat to these portions of our gas load just the same. I think it is fair also, to say that the business conditions over the past three years have greatly accelerated the acceptance of stoker equipment on the part of gas consumers, and have created a most favorable opportunity for their sales. I further believe that with the initial improvement in our economic conditions they will be given additional opportunities when more money will be available, to make changes that may be considered economically feasible.

Since this competition is not a temporary threat to our business, and is only aggravated by business conditions, there is all the more reason why the decisions we make today, and the policies that we set up now, will have a very important bearing on the future success of our gas load in these fields.

Stated simply, when we consider the question of what can or should the gas industry do about stokers, it seems to me there are only two logical courses open: First, we can accept the competition as being an inevitable development in industry and do nothing other than sell gas to bakers, building operators, and home owners who apply for it and let the stoker promoters have a wide open field for the promotion of their product. If this course is followed, it may be that in time they will take pity on the gas industry and transfer their efforts to some other application, but this does not seem likely.

Second, we can adopt a really aggressive and offensive sales policy and attack stoker competition on all sides with new weapons and new methods such as have never been called into use before for the promotion of natural gas in these competitive fields. It seems to me that there is no other course that we can honestly follow in the face of this competition. In my opinion, to attempt to meet this competition with old, defensive merchandising methods, would be about the same as doing nothing. Therefore, if we attack this competition at all, it must be an aggressive attack using poli-

cies and methods that we have not generally employed up to this time.

Let's discuss for a moment what we could do if we elect to attack this competition really aggressively.

#### 1. *Analysis of Existing Load and Future Market:*

An activity of this sort should cover the complete segregation, inspection, and analysis as to degree of satisfactory operation of all our existing central plant jobs and bakeries that use gas as a fuel. Such analysis should also be extended to our potential prospects in this field. In embarking upon an activity to hold existing load and to acquire additional load, it is always most important that we know what our problem is, where our present users and prospects are, and the condition of the service our present users are getting; therefore, a market analysis is put first in this list.

#### 2. *Special Central Plant Heating Representatives:*

After our analyses have been completed, the next logical step would seem to be to assign a sufficient number of men the specific duties of contacting present and potential gas users. The idea behind this recommendation is not to expect the regular industrial gas men to take care of the large heating jobs in connection with other industrial work, or not to expect the man who sells water heaters, gas ranges and other appliances, to also take care of central home heating. This stoker competition calls for men of specialized knowledge and experience.

#### 3. *Special Attention to Existing Inefficient Gas Jobs:*

It goes without saying that our weakest point for attack by our competitors is to pick on those of our gas jobs that are using (in some cases from 20 per cent to 40 per cent) too much gas, either on account of inefficient heating systems or incorrect gas combustion. Undoubtedly the market analysis will reveal a number of such inefficient jobs and those should be given immediate and special attention.

#### 4. *Special Promotional Advertising:*

Advertising and promotional literature, properly used, are always an important aid to any salesman. The thought contained in this recommendation is that advertising messages and promotional literature should be prepared specifically for the user of gas in stoker competitive jobs whether it is in the home, an office building, an institution, or a bakery.

#### 5. *Utilization Follow-Up Service:*

We all know that there are many good central heating jobs on our lines that have poor burner adjustment, controls out of order, thermostats not working or improperly located, and many other heating ills of a minor or major character. In any aggressive campaign, it seems to me that it would

Operating Costs	No. 1		No. 2		No. 3		No. 4		No. 5	
	Gas	Coal	Gas	Coal	Gas	Coal	Gas	Coal	Gas	Coal
1. Fuel	\$2,200.00	\$ 500.00	\$2,337.87	\$496.94	\$600.00	\$170.00	\$720.00	\$225.00	\$778.50	\$190.83
2. Labor	—	1,600.00	—	—	—	144.00	—	—	625.00	625.00
3. Power	—	87.50	—	—	—	27.20	—	—	—	32.40
4. Miscellaneous Supplies	—	10.00	—	—	—	5.00	—	—	—	10.00
5. Ash Removal	—	(Incl. in Coal Cost)	—	—	—	10.20	—	—	—	—
<b>Maintenance</b>										
6. Maintenance (Stoker; Burner)	—	100.00	—	—	—	36.00	—	—	—	—
7. Maintenance (Boiler; Comb. Chamber)	25.00	50.00	—	—	25.00	50.00	—	—	—	—
<b>Fixed Charges</b>										
8. Interest & Depreciation: (Stoker; Burner)	354.50	774.00	—	—	45.00	192.00	—	—	—	100.00
9. Interest & Depreciation: (Coal Bin)	—	20.00	—	—	—	20.00	—	—	—	—
10. Rental Value; Coal Bin	—	50.00	—	—	—	70.00	—	—	—	—
11. Taxes & Insurance: (Burner; Stoker; Coal Bin)	32.23	64.50	—	—	5.00	12.00	—	—	—	—
<b>Total</b>	<b>\$2,611.73</b>	<b>\$3,256.00</b>	<b>\$2,337.87</b>	<b>\$496.94</b>	<b>\$675.00</b>	<b>\$736.40</b>	<b>\$720.00</b>	<b>\$225.00</b>	<b>\$1,403.50</b>	<b>\$958.23</b>

## Legend

	Coal Costs	Time Bases
1. Greenhouse	\$2.00 with ash removal	Annual
2. Apartment	2.00 with ash removal	Annual
3. Institution Building	2.00 without ash removal	Annual
4. Stoker on Bread Oven	3.00 without ash removal	Annual
5. Stoker on Process and Heating Boiler	2.48 with ash removal	Five Months

TABLE 1

Actual Customer Accepted Comparative Gas vs. Coal Costs Under Present Conditions

Operating Costs	No. 1		No. 2		No. 3		No. 4		No. 5	
	Gas	Coal	Gas	Coal	Gas	Coal	Gas	Coal	Gas	Coal
1. Fuel	\$2,200.00	\$ 500.00	\$2,337.87	\$ 496.94	\$600.00	\$170.00	\$720.00	\$225.00	\$ 778.50	\$ 190.83
2. Labor	—	1,600.00	—	192.00	—	144.00	—	192.00	625.00	625.00
3. Power	—	87.50	—	74.40	—	27.20	—	30.00	—	32.40
4. Miscellaneous Supplies	—	10.00	—	10.00	—	5.00	—	10.00	—	10.00
5. Ash Removal	—	(Incl. in Coal Cost)	—	(Incl. in Coal Cost)	—	10.20	—	15.00	—	—
<b>Maintenance</b>										
6. Maintenance (Stoker; Burner)	—	100.00	5.00	45.00	—	36.00	—	21.00	5.00	30.00
7. Maintenance (Boiler; Combustion Chamber)	25.00	50.00	—	50.00	25.00	50.00	—	10.00	—	100.00
<b>Fixed Charges</b>										
8. Interest & Depreciation: (Stoker; Burner)	354.50	774.00	—	240.00	45.00	192.00	—	112.00	—	66.65
9. Interest & Depreciation: (Coal Bin)	—	20.00	20.00	20.00	—	20.00	—	10.00	8.30	8.30
10. Rental Value; Coal Bin	—	50.00	—	75.00	—	70.00	—	35.00	—	41.65
11. Taxes & Insurance: (Burner; Stoker; Coal Bin)	32.23	64.50	—	15.00	5.00	12.00	—	7.00	—	5.00
<b>Total</b>	<b>\$2,611.73</b>	<b>\$3,256.00</b>	<b>\$2,362.87</b>	<b>\$1,218.34</b>	<b>\$675.00</b>	<b>\$736.40</b>	<b>\$720.00</b>	<b>\$667.00</b>	<b>\$1,416.80</b>	<b>\$1,109.83</b>

## Legend

1. Greenhouse	Labor—Cleaning fire, removing clinker and filling hopper.
2. Apartment	2 times per day. Estimate 2 hour per day—40c per hour—30-day month.
3. Institution Building	Power—10 Kw. per ton coal.
4. Stoker on Bread Oven	Coal Bin Space—50c per square foot per year.
5. Stoker on Process & Heating Boiler	Taxes and Insurance—1% of total value of equipment.

TABLE 2

Complete Gas vs. Coal Cost Under Present Conditions Including Customer Accepted Cost Together With Estimated Real Costs Not Accepted By All Customers

Operating Costs	No. 1		No. 2		No. 3		No. 4		No. 5	
	Gas	Coal	Gas	Coal	Gas	Coal	Gas	Coal	Gas	Coal
1. Fuel	\$2,200.00	\$ 750.00	\$2,337.87	\$ 743.00	\$600.00	\$340.00	\$360.00	\$300.00	\$521.00	\$ 243.00
2. Labor	—	1,600.00	—	875.00	—	180.00	—	240.00	166.00	800.00
3. Power	—	87.50	—	74.40	—	27.20	30.00	30.00	10.00	32.40
4. Miscellaneous Supplies	—	10.00	—	10.00	—	5.00	—	10.00	5.00	10.00
5. Ash Removal	—	50.00	—	50.00	—	17.00	—	20.00	—	16.20
<b>Maintenance</b>										
6. Maintenance (Stoker; Burner)	—	100.00	10.00	100.00	—	45.00	24.00	25.00	5.00	30.00
7. Maintenance (Boiler; Combustion Chamber)	25.00	50.00	—	50.00	25.00	50.00	—	10.00	20.00	100.00
<b>Fixed Charges</b>										
8. Interest & Depreciation: (Stoker; Burner)	354.50	774.00	—	240.00	45.00	192.00	128.00	112.00	208.80	66.25
9. Interest & Depreciation: (Coal Bin)	—	20.00	20.00	20.00	—	20.00	—	10.00	—	8.30
10. Rental Value; Coal Bin	—	50.00	—	75.00	—	70.00	—	35.00	15.00	41.65
11. Taxes & Insurance: (Burner; Stoker; Coal Bin)	32.23	64.50	—	15.00	5.00	12.00	8.00	7.00	25.00	5.00
<b>Total</b>	<b>\$2,611.73</b>	<b>\$3,556.00</b>	<b>\$2,367.87</b>	<b>\$2,252.40</b>	<b>\$675.00</b>	<b>\$958.20</b>	<b>\$550.00</b>	<b>\$799.00</b>	<b>\$975.80</b>	<b>\$1,352.80</b>

## Legend

	Coal Costs	
1. Greenhouse	\$3.00 without ash removal	20c per ton coal
2. Apartment	3.00 without ash removal	ash removal costs
3. Institution Building	4.00 without ash removal	*Estimated on basis of
4. Stoker on Bread Oven	4.50 without ash removal	air heater installation in oven
5. Stoker on Process & Heating Boiler	3.00 without ash removal	**Estimated on basis of new gas boiler close to job.

TABLE 3

Complete Comparison of Gas vs. Coal Costs Under Normal Business Conditions. Gas Cost Figures Take Into Consideration Charges for New Equipment to Improve Efficiency Where Advisable

Item	Comparative Costs		
	Automatic Gas	Hand-Fired Coal	Stoker-Fired Coal Probable Cost
1. Fuel Coal	\$2,000.00	\$ 735.00	\$ 550.00
2. Labor	—	2,160.00	1,440.00
3. Power	54.00	—	60.00
4. Miscellaneous Supplies	—	50.00	50.00
5. Ash Removal	—	50.00	50.00
6. Equipment Maintenance	15.00	—	50.00
7. Boiler Firebox Maintenance	50.00	100.00	150.00
8. Interest & Depreciation on Equipment	108.00	—	197.00
	\$2,227.00	\$3,095.00	\$2,547.00

TABLE 4  
Water-Tube Boiler in Industrial Plant for Building Heating & Process Steam. Hand Firing Replaced by Automatic Gas Burners

be the duty of the Gas Company to take the initiative in the correction of these improperly adjusted appliances and heating systems. The customer may eventually get around to making these changes himself if he knows what is wrong, but too often he will be inclined to blame gas for whatever trouble exists rather than inquire into whether all of his heating apparatus is working properly. I am not here advocating that complete free service should be given on such equipment, but I believe it should be made as liberal as possible and we should certainly take the initiative by calling these defects to our customer's attention and to recommend remedies.

#### 6. Promotion of Better Designed Equipment:

Anyone who is familiar with the gas applications subjected to this stoker competition, knows there are many appliances as gas boilers, bake ovens in the bakery field, and conversion gas burners that do not develop the best results from our fuel. It should be our duty, therefore, to exert every effort and influence at our command to influence our appliance manufacturers to build better bake ovens more adapted to gas, better conversion burners for boilers, etc., and cheaper but good gas boilers.

#### 7. General Use of Natural Gas Publicity:

In my opinion, special promotional advertising and literature for those gas uses in competition with the bituminous coal stoker is not enough. Such programs should be backed up with general use of natural gas advertising and promotion on a far greater scale than the natural gas companies ever attempted. We should tell our general public about natural gas service and let them know we exist. Tell our public that we have a heating service for sale and that it is modern and up-to-date. Give them the romance of the natural gas business.

Most of the suggested activities previously mentioned are those that are considered more or less conventional promotional activities and have been used either partially or wholly in the promotion of the gas business at various times. In other words, the first seven suggestions contain no particularly new promotional ideas but as pointed out before, an unusual competitive situation may call for unusual remedies, both defensively and offensively. It is with this thought in mind that I have let my imagination wander a bit and thought of

a few additional things that Gas Companies might do against this competition that have not been tried before, or at least have not been generally accepted and widely used by Gas Companies throughout the country.

In presenting these additional suggestions which I consider as being supplementary to the previous list of activities, I am not here proclaiming the complete soundness of all of these ideas; neither am I pretending that the ideas suggested have been completely worked out, but I am presenting them with the idea that subjected to constructive criticism and thought, new tools and weapons may be developed that will give us greater resistance against this competition and increased aggressiveness for new load in these fields.

#### 1. Liberal Merchandising of Power Burners, Gas Boilers, and Conversion Burners:

As already pointed out, the stoker people sell their apparatus to our good gas customers by offering to take the difference between their former existing gas bills and the estimated coal cost and apply that as payment on their stoker without requiring any down payment on the stoker. In these times when cash is scarce, the average building operator, residence owner, or baker who has inefficient gas burners, it is admitted, is not willing to make an outlay for more efficient gas equipment on a definite time schedule of prices or on a cash basis, without any definite guarantee of savings to be effected by the new equipment.

Suppose for example, we could go to a building operator who has an inefficient gas burner in a coal boiler using an estimated 25 per cent more gas than he should, and offer to him to install the most efficient gas burner we have available on a basis of no-down-payment and monthly payments equal to 1/12 the annual estimated savings in the gas bill anticipated by the installation of new burners, I believe we would be able to replace more of these inefficient burner applications. The same plan might be applied to merchandising a new gas boiler when it is to replace an old gas boiler or an old coal boiler converted unit.

#### 2. Stoker-Competition-Slanted Advertising and Promotional Literature:

The advertising promotional matter recommended in the previous conventional platform, referred only to that type of literature prepared specifically to display and

emphasize the advantages of gas heat. Now, since the stoker people are not following altogether ethical practices along this line, and I have shown you examples here today of literature specifically addressed against natural gas heating in homes, commercial buildings, or bakeries, if we so desired, we could get out some literature of this sort and call attention to the fallacies of the stoker people's arguments. I recognize that there is considerable room for discussion as to the value of such advertising; nevertheless it seems to me it is something worth thinking about. The public likes a good fight these days.

#### 3. Complete Gas Heating Service for Larger Installations:

After all, we know the owner of a large building buys gas or coal for comfort during the colder seasons of the year. He is not so much concerned as to whether that comfort comes from gas or coal fuel as long as it is satisfactory and economical. Also, the large building owner is not primarily interested in boilers, burners, heat controls, etc.; he is interested in results—heating comfort.

Now, why couldn't the gas industry, in this field at least, offer to such operators a complete heating service wherein the Gas Company would install either a gas boiler or a gas burner in the already existing coal boiler or boiler room and agree for a definite period of years to operate this boiler installation and sell the customer steam measured by a suitable condensation return meter? Such plan would relieve the customer of worries as to whether his boiler was operating efficiently and whether all the controls were in the best of condition, and place that burden upon the utility itself.

Such a plan would go a step beyond the service offered by any stoker dealer or coal dealer at the present time in this district, in that we would agree to operate the boiler plant, maintain it, furnish the fuel, keep the plant in adjustment, all for a certain stipulated price per thousand pounds of steam. Obviously our rates would have to be changed so that we could sell pounds of steam at certain prices rather than cubic feet of gas.

You may say that such a scheme is radical and un-workable. If that is your thought, just remember these suggestions are offered to stimulate constructive criticism and discussion.

#### 4. New Method of Heating Bake Ovens and Special Utilization Research:

In the special field of heating with the stoker in the brick bake oven application, we could attack this problem by attempting to work out a more efficient method of heating these ovens. Nobody has definitely demonstrated that the present thermal characteristics of a mass of brick such as the usual peel oven, is the best obtainable. It seems to me, a little research along this line as well as research and inquiry as to whether we have the most efficient method of applying our gas heat in some of the

(Continued on page 302)

# Research in Fundamentals of Combustion Space Requirements in High Temperature Gas Furnaces

## PART I

By E. O. Mattocks

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**A**LTHOUGH the burning of fuels in furnaces has been practiced for centuries, little definite information has yet been obtained concerning the fundamental laws governing the proper design of spaces in which gaseous fuels are to be burned. Investigations, made prior to the incep-

tion of this study, clearly reveal a lack of uniformity in the size and design of combustion chambers of standard industrial gas furnaces intended for similar operating temperatures and production capacities. Not only are these inconsistencies present, but also the average rate of heat liberation per unit of combustion space in present American practice is not as great as that generally desired. One industrial gas furnace manufacturer recently aroused considerable interest and comment by making a claim that his furnaces were capable of liberating an amount of heat considerably above this average. However, the results of the investigation referred to herein show that a heat liberation per unit of combustion space much higher than that reported by this manufacturer is possible under certain conditions. While expediency may account for some of this variation of design, investigation clearly shows the greatest cause for disagreement concerning the principles of furnace design to be the absence of authoritative information regarding the fundamentals of combustion space requirements. Realizing this need for basic information, the Committee on Industrial Gas Research of the American Gas Association has instigated Research in the Fundamentals of Combustion Space Requirements in High Temperature Gas Furnaces, and assigned the problem to the American Gas Association Testing Laboratory, Cleveland, Ohio, where test work has been in progress since the latter part of 1931.

It is well known among industrial gas engineers that the efficiency and therefore the final cost of operating high temperature furnaces is affected by the size, shape, and location of the combustion chambers. Nor are these the only factors that affect the efficiency of furnace operation. The basic principles of furnace working chamber, flue, and burner design must also be known in order to construct suitable furnaces. If, however, these fundamental design principles are to be generally applicable to all

types of high temperature furnaces, they must be studied not merely from a purely constructional viewpoint, as has generally heretofore been the case, but rather from the standpoint of combustion, resultant furnace temperatures, pressures, and atmospheres. So many factors or variables are involved in this problem that W. Trinks, a recognized authority on industrial furnace design, has aptly stated, "Definite values for the amount of space which is required for combustion are hard to find in literature, because of the large number of variables which obscure the effect of each variable." Nevertheless, while the number of factors is large, they may all be classified with respect to location into four general groups; namely, variables associated with (1) the flue, (2) the furnace proper or work chamber, (3) the combustion chamber or combustion space, and (4) the burner or burners. For the present, the second group of variables, which deals with the furnace proper, is not being studied, since this portion of furnace assemblies is receiving attention in connection with other projects fostered by the Committee on Industrial Gas Research of the American Gas Association.

### Summary

This research in combustion space requirements for industrial gas furnaces is only partially completed; consequently, the data presented in this paper should, in most cases, be considered as indicative and not necessarily conclusive of the results to be expected in practice. It is believed, however, that the information secured to date will be of considerable value to those interested in the design and operation of industrial gas furnaces, and should serve as an effective guide within the limits stated. Additional information will be published in the future for the purpose of verifying and augmenting the present data.

The results obtained thus far in this investigation may be briefly summarized as follows:

1. For a given heat input, varying the size, shape, or number of flues had little effect upon the flue temperature. Generally, however, the smaller the flue opening, the higher the flue temperature.
2. For a given heat input, varying the size, shape, or number of flues had practically no effect upon the outside furnace

wall or inside furnace wall temperature distribution.

3. For a given heat input, varying the size, shape, or number of flues had no apparent effect upon the amount of gas that could be completely burned. However, the tested inputs never exceeded 75,000 B.t.u. per hour per cubic foot of combustion space.

4. The "motive" pressure, which was considered as the total force causing the products after combustion to flow through the furnace and out the flue, was found to be practically independent of flue or furnace construction.

5. For a given furnace, the relationship between the "true" furnace pressure and the average hot flue gas velocity through the flue was found to be independent of the flue area.

6. A method was developed by which the total flue area required to produce any desired furnace pressure could be calculated for a given furnace, temperature, gas, heat input, and atmosphere.

7. The size of the combustion chamber, within the limits tested, did not appear to alter, materially, the amount of gas that could be completely burned per hour per cubic foot of combustion space.

8. Excessively high furnace pressures appeared to interfere materially with the combustion of the gas.

9. There appeared to be little difference between using coke oven gas and natural gas from the standpoint of the amount of heat that could be liberated per hour per cubic foot of combustion space.

10. For a given heat input (less than 75,000 B.t.u. per hour per cubic foot of combustion space), the number of burners used did not appear to exert any measurable effect upon combustion.

11. For a given heat input (more than 100,000 B.t.u. per hour per cubic foot of combustion space), the port size appeared to affect materially the combustion of the gas; the smaller the port the better the combustion.

12. For a given degree of premixing the air and gas, the type of premixing burner employed did not appear to influence the combustion of the gas at the lower inputs.

### Part I. Investigation of Flues

The first phase of high temperature furnace design to be investigated was the effect of the flue upon the furnace operation. While all of the other variables, affecting furnace performance, were kept constant, the size, shape, location, and num-

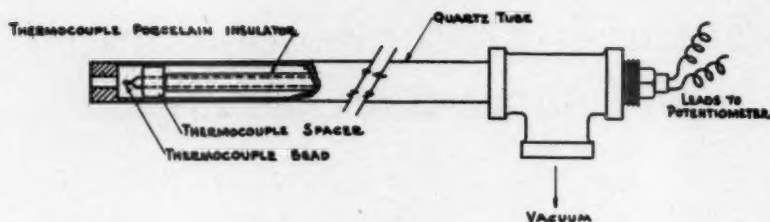


Fig. 1

A.G.A. high velocity thermocouple

ber of the flues were changed in turn. For each of these changes in the nature of the outlet for combustion products, the effect upon: (1) The flue temperature, (2) the temperature distribution within the furnace, (3) combustion, and (4) the furnace pressure, were determined. All of these factors as affected by the flue have been investigated at considerable length and the results are reported herein. Although it has been common practice for years to vary the size of the flue to secure a desired furnace pressure, no definite information was found in the literature concerning any method of predetermining the size of the flue necessary to produce a given furnace pressure. From the results of this investigation, a formula has been developed by which the flue size required to yield a desired furnace pressure can be determined.

#### A. Test Apparatus and Procedure

In order to arrive at the best plan of test procedure, two preliminary test furnaces were constructed at different times to facilitate the development of the necessary equipment and technique. At the very beginning of the investigation several difficulties became apparent, and these had to be eliminated before actual test work could be initiated. Foremost among these difficulties was the measurement of the true temperature of the hot flue gas.

Normally, high temperature measurement is thought of as a rather simple operation involving the use of a thermocouple and a recorder of some kind or, perhaps, the use of some type of optical or radiation pyrometer if the temperature is beyond the satisfactory range of the thermocouple. The results of such procedures yield relative temperatures that are, for most practical purposes, as valuable as the "true" temperature itself. However, when the temperature of the flue gas was measured in this investigation the "true" temperature of the gas was recorded in order that certain calculations based on this temperature be correct and that assurance be had that flue gas temperature measurements could be duplicated or justifiably compared regardless of the particular flue construction employed.

Before further comments are made on the subject of "true" temperature measurements, the actions influencing a thermocouple temperature reading should perhaps be considered. If an unprotected thermocouple is placed inside an operating furnace, the thermocouple bead, where the small

measured electrical potential is generated, receives (or loses) heat by several methods. First, the hot gas rushing past the thermocouple bead imparts heat to the relatively cold wire by conduction; second, the hot furnace walls radiate a certain amount of heat to the thermocouple; and third, the thermocouple radiates heat to the furnace walls. This combined action continues until a condition of thermal equilibrium is established, i.e., until a constant temperature reading is observed. Whether the resulting temperature is higher or lower than the "true" gas temperature is dependent upon the conditions within the furnace. For example, if the furnace walls are poorly insulated the temperature as measured by an unprotected thermocouple would probably be lower than that of the gas passing the thermocouple bead. In other words, because of the poor insulation the temperature of the walls is lower than the temperature of the gas and, therefore, more heat is radiated from the hotter thermocouple bead to the colder furnace walls than in the opposite direction, and the recorded temperature is low. If, on the other hand, a protecting tube is used to shield the thermocouple from the hot furnace gas, the effect of radiation upon the temperature of the protecting tube is similar to its action upon an unprotected couple. In addition, another factor is encountered; there is a certain amount of heat removed by conduction from the hot end of the protecting tube to the cooler end that extends out of the furnace. This factor may amount to a considerable loss depending upon the depth of insertion of the protecting tube in the furnace. The greater the insertion the less the error.

To overcome the above difficulties and to secure a measurement closely approximating the "true" gas temperature, a so-called "high velocity thermocouple" was built. Its construction is shown in Fig. 1. This new device consists of an ordinary chromel-alumel thermocouple (carried by a porcelain insulator) placed in the middle of a quartz tube, one end of which is closed except for a small opening. The other end of the quartz tube is connected to a vacuum line. The thermocouple bead, which is held on the axis and inside of the quartz tube by a porcelain spacer, is located close to the small opening in the restricted end of the quartz tube. After this assembly is so placed that the end of the quartz tube is in the part of the furnace where the temperature measurement is desired, the vacuum

is turned on, and the rush of hot furnace gases into the tube and past the thermocouple bead raises the temperature of the bead to that of the gas. Although the quartz tube that surrounds the thermocouple is subject to radiation in exactly the same manner as is an unprotected thermocouple, the effect of the radiation is not transmitted to any great degree through the walls of the quartz tube. This fact was proven by placing a platinum sleeve over the outside of the whole section of the quartz tube occupied by the thermocouple bead. The resulting temperature was about the same as the temperature recorded without the platinum protection. Inasmuch as the opening in the restricted end of the quartz tube is so small, and as the bead is set into the tube a little distance, the radiation through this opening can be neglected. One precaution has to be taken, however, in securing the "true" temperature; namely, that the quantity and velocity of gas passing the bead be sufficient to insure a negligible temperature differential between the thermocouple bead and the hot gas, and between the hot gas entering the tube and the gas passing the bead. Therefore, a good vacuum is required and a period of time after it is turned on must be allowed for the restricted end of the quartz tube and the thermocouple to reach equilibrium temperatures.

After the above means of securing accurate flue gas temperature measurements had been adopted and proved the next step, the development of practical methods for determining and controlling the furnace atmosphere was undertaken. The analysis of flue gases seemed to present the greatest possibilities in this direction, and to accomplish that end a special modified Orsat type of gas analysis apparatus was constructed. With this piece of equipment, the carbon dioxide ( $\text{CO}_2$ ), oxygen ( $\text{O}_2$ ), carbon monoxide ( $\text{CO}$ ), hydrogen ( $\text{H}_2$ ), and the presence of hydrocarbons, could be determined. The amount of reducing products, carbon monoxide and hydrogen, were determined by the use of a copper oxide tower maintained at a temperature of about 580 degrees Fahrenheit. A slow combustion pipette was used for determining the presence of hydrocarbons. After the proper

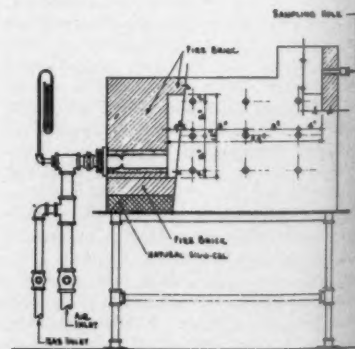


Fig. 2

A.G.A. test furnace C-1

technique of operation had been acquired, flue gas analyses could be made with an accuracy of about 0.1 per cent.

As a result of the data obtained from preliminary tests, experimental work was started on a 2-cubic foot combustion space furnace, 24 inches long, 12 inches wide, and 12 inches high. This furnace has been identified by the number C-1. A pressure burner with an 11/16 inch diameter port was installed with a refractory tunnel in one end of the furnace midway between the side walls. The center of the burner was located 3 7/8 inches from the bottom or floor of the furnace. A drawing of furnace C-1 is shown in Fig. 2. With this set-up, input to the furnace could be varied sufficiently to produce any furnace temperature between 1200 and 2400 degrees Fahrenheit. As a result of preliminary tests, the flue was necessarily located as far from the burner as possible in order to prevent the hot furnace gas from by-passing direct to the flue from the burner instead of following the contour of the furnace to the outlet. Also, in accordance with early findings, the flue was constructed in the top of the furnace midway between the side walls and flush with the interior end wall opposite the burner, as shown in Fig. 2. A sampling hole was provided in the side of the flue, which extended for a distance of 4 1/2 inches above the outside of the furnace at a point in a plane with the outside surface of the furnace top. Flue gas samples and flue gas temperatures were taken through this outlet, which was closed when not in use. To measure internal furnace temperatures and furnace pressures at various points, nine openings were constructed in one side of the furnace, as shown in Fig. 2. These openings were provided with tight fitting refractory plugs which remained in the holes except while readings were being taken.

The temperatures inside the furnace were measured with unprotected chromel-alumel thermocouples. Although this procedure did not yield true furnace temperatures, the results secured were nevertheless sufficiently accurate for the purpose intended. To determine the variations in internal temperature distribution caused by changing the flues the readings of one test were com-

TABLE 1  
DESCRIPTION OF FLUES USED ON FURNACES C-1 AND C-2

Designation	Size and Shape of Opening	Area	
		Square Inches	Square Feet
F-1	4 1/2" x 4 1/2" square	20.25	0.1407
F-2	3 1/2" x 3 1/2" square	12.25	0.0850
F-3	2 3/4" x 2 11/16" (Approx. 2 3/4" square)	7.395	0.0514
F-4	2" x 2" square	4.00	0.0278
F-5	2 3/8" dia. round	4.43	0.0308
F-6	3 1/2" dia. round	9.63	0.0668
F-7	Two 2 3/4" x 2 3/4" square	15.12	0.1050
F-8	Two 1 1/2" x 1 1/2" square	4.50	0.0312
F-9	Two 1 1/8" dia. round	4.476	0.0311

pared with the corresponding readings of another test at the same heat input. Outside surface temperatures were measured with a surface thermocouple. This type of thermocouple was made by welding the bead of a chromel-alumel thermocouple to a small copper plate which, in making the measurements, was held against the brick surface. Measurement of the furnace pressure was made by means of a tight fitting hollow plug connected to a slope gauge containing xylene. The plug was so made that it could be inserted in any one of the side openings of the furnace. Pressures were measured to 0.001 inch of xylene (0.00091 inch of water). A view of the general layout of furnace and equipment as described above is shown in Fig. 3. This picture, however, was taken of one of the preliminary furnaces which did not possess all of the refinements of the actual test furnace.

The first step in the procedure of collecting test data was the adjustment of the air and gas to give approximately the desired heat input to the furnace under conditions of a neutral furnace atmosphere. To insure equilibrium conditions, the furnace was allowed to operate at this setting for several hours, after which interval a sample of flue gas was taken and analyzed. The furnace was considered sufficiently well adjusted when the analysis revealed the presence of no more than 0.5 per cent oxygen or an equal amount of carbon monoxide and hydrogen. In case a greater quantity of these gases was present in the sample analyzed the gas input was changed until a satisfac-

torily neutral atmosphere was secured. However, after each new setting (even though conditions may have been but slightly changed) the furnace was allowed to operate for an interval of from one-half to one hour before another flue gas sample was analyzed. To help maintain equilibrium conditions, the furnace was operated 24 hours daily.

After the furnace had been set at the required rate of input and a neutral atmosphere had been secured, the true flue temperature, internal furnace temperature at 18 points, outside surface temperature at 8 points, furnace pressure at 9 points, and the gas input to the furnace were recorded. From 4 to 6 tests were taken between the temperature range of 1200 to 1600 degrees Fahrenheit. After obtaining these data, a new flue was installed on the furnace and new tests conducted.

During this investigation, consideration was given only to the most common shapes of flues, square and round. To have tested the more special shapes would have involved lengthy test periods which were not warranted in this study. Single square and round flues of different sizes were tested as well as double flues (i.e. flues each consisting of 2 identical but separated openings) of different types and sizes. The dimensions and area of the tested flues are given in Table 1.

#### B. Discussion of Results of the Flue Investigation

The results obtained from this investigation of flues will be discussed in the following sequence:

1. Effect of flues upon flue temperature.
2. Effect of flues upon furnace and wall temperature distribution.
3. Effect of flues upon combustion.
4. Effect of flues upon furnace pressure.

#### 1. Effect of Flues Upon Flue Temperatures.

For the 9 flue conditions tested, the true flue temperature was plotted against the heat input in B.t.u. per hour per cubic foot of combustion space, as shown in Fig. 4. For the sake of clearness, only the bounding curves in this figure are actually drawn. From these curves, it is seen that the maximum temperature variation between flues is about 120 degrees Fahrenheit at an input of 70,000 B.t.u. per hour per cubic foot of combustion space. This



Fig. 3

View of some of the equipment and one high temperature test furnace used in the investigation of flues

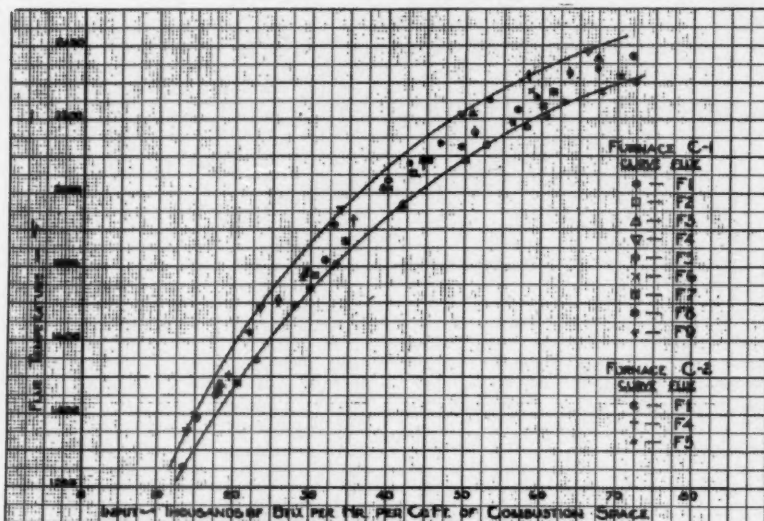


Fig. 4

*Effect of different flues upon the flue temperature vs. input relationship*

amounts to a total input of 140,000 B.t.u. per hour to the furnace. Although several factors probably contributed to the cause of this difference in temperature, in general, the smaller the flue opening the higher was the flue temperature. This may be accounted for by the fact that the smaller the flue opening the smaller the amount of radiated heat lost out through the flue opening. Since it was impossible to keep all other constructional details constant when flues were changed, e.g. the total outside surface area of the furnace and the flue wall thickness, other factors than the area of the flue openings may contribute to the temperature differences noted. The variations in the flue temperature for the same input, resulting from using the nine different flues listed in Table 1, were in general small, and probably due to the constructional changes mentioned above and not to any alteration of combustion conditions.

## 2. Effect of Flues Upon Furnace and Wall Temperature Distribution.

In general, little effect was observed in either the inside wall or outside wall temperature distribution as a result of changing the flue conditions. Small variations in these temperatures were encountered, but these corresponded to the differences experienced in the flue temperatures. No other temperature variations directly attributable to varying the flues was noticed.

## 3. Effect of Flues Upon Combustion.

Although a range of furnace pressures from 0.02 to 0.25 inch water column was encountered by altering the flue, practically absolute neutral conditions were obtainable at all times. However, this may be accounted for by the fact that the maximum input was less than 75,000 B.t.u. per hour per cubic foot of combustion space. In the light of later work

conducted on this factor, this rate seems to be a rather low input at which to expect noticeable changes in the nature of combustion of the gas.

## 4. Effect of Flues Upon Furnace Pressure.

That changing the size of the flue would produce changes in furnace pressure was expected. However, to develop a method of determining the flue size required to yield a given furnace pressure was the ultimate goal of this phase of the investigation, and much testing was required in checking theories that arose in the course of this development. Such a method has

been evolved as a result of this investigation and it should apply, within reason, to any type or size of furnace.

When the average furnace pressure was plotted against the input per cubic foot of combustion space for each of the flue conditions tested, certain irregular conditions appeared. For example, from Table 1, it may be seen that the total areas of the flues, F-5, F-8, and F-9, were almost the same, yet each one of these flue conditions yielded a separate curve in Fig. 5. Apparently, this discrepancy was due to inaccuracies in the furnace pressure measurements (which were of static pressure only) caused by the existence within the furnace of relatively large velocity pressure components. As a result, each furnace pressure reading was corrected by adding an amount equal to the velocity pressure existing in the furnace during that test. This condition (rather unusual in practice), in which relatively large velocity pressures occurred in the furnace chamber, was due to the smallness of the test furnace which did not permit the conversion of the velocity pressure into static pressure before the gases were exhausted out the flue. When the corrected average "true" furnace pressure (static plus velocity) was plotted against the input per cubic foot of combustion space, a more reasonable series of curves resulted, although, of course, each flue area still yielded a separate curve (see Fig. 6).

In order to obtain a fairer common basis of comparison for the different flue conditions tested, the average "true" furnace pressure was plotted against average hot flue gas velocity through the flue instead of against the input to the system. The result was a single curve for all the

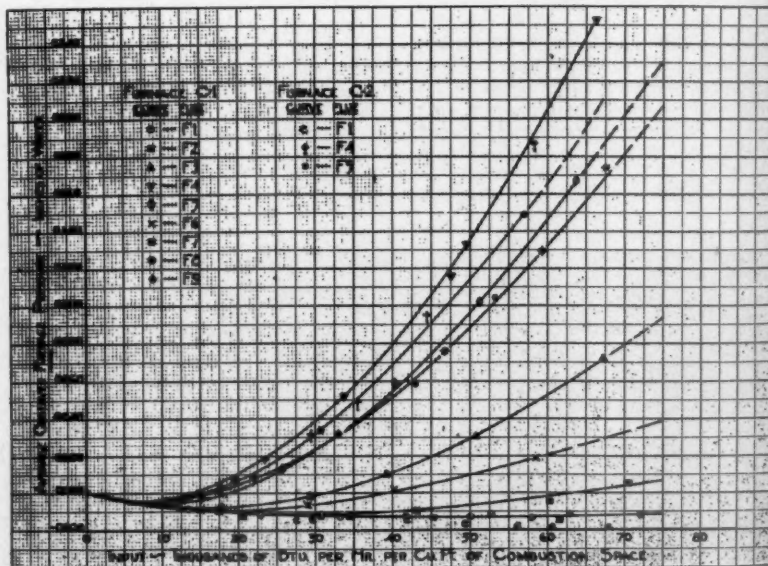


Fig. 5

*Effect of different flues upon the relationship between observed furnace pressure and input*

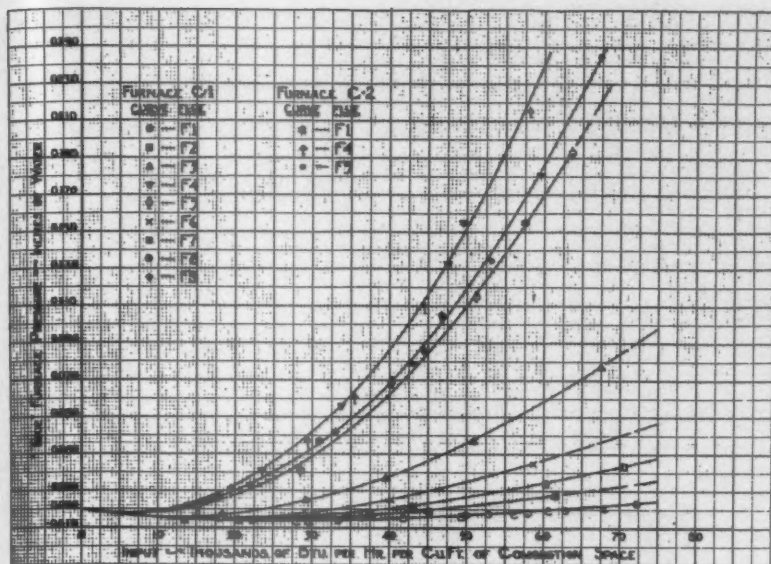


Fig. 6

Effect of different flues upon the relationship between "true" furnace pressure and input

flue conditions tested, and not a series of curves as previously noted. This curve is shown in Fig. 7. The peculiarity of this curve is that with average hot flue gas velocities of from zero to about 12 feet per second, the furnace pressure is negative (vacuum). In other words, the draft effect caused by the flue is larger than the pressure forcing the gas out the furnace. Therefore, to employ a more absolute pressure basis and overcome the variability of the "true" furnace pressure for a given flue and input with different furnaces, a so-called "motive" pressure was created. "Motive" pressure is the pressure which causes the hot gas to flow through the furnace and out the flue, and is equal to the "true" furnace pressure plus the draft pressure or chimney pull. When the "motive" pressure was plotted against the average hot flue gas velocity, as shown in Fig. 8, the resulting curve no longer dipped into the negative pressure region. This curve represents the total pressure (static plus velocity plus draft) in inches of water required to move the hot gas through the furnace and out the flue at a definite velocity, and is practically independent, within the limits tested, of the furnace and flue construction.\*

On the basis of this "motive" pressure, the coefficient of discharge of each of the

flues tested was computed at various inputs and plotted against the average hot flue gas velocity. The resulting curve, shown on Fig. 9, is rather interesting, for the coefficient of discharge of all the flues appears to be the same at any flue gas velocity and constant when the average hot flue gas velocity is greater than 30 feet per second.

The obtaining of a single curve for both "motive" pressure and coefficient of discharge when using both single and double flues, in both square and round shapes, may appear very unusual. Although square flues have more surface per unit of cross-sectional area than do circular flues, the

pressure loss due to friction in all cases tested was relatively small, for the flue was only 7 inches high. Doubtlessly, very little friction loss was likewise encountered in the furnace proper for the velocity of the hot gas in the furnace was relatively low as compared to that through the flue.

### C. Method of Determining Total Flue Area Required To Produce a Given Furnace Pressure

The method developed for computing the total flue area required to yield a certain furnace pressure is as follows:

1. The average required furnace pressure must be decided upon, as well as the inputs at which this pressure is most desired. Since most industrial gas-burning equipment is designed to operate over a range of gas inputs, the chosen furnace pressure is generally required for some particular gas rate. Usually, the minimum or holding gas rate is used; then a pressure of at least the amount selected exists in the furnace at all higher gas rates when the furnace doors are closed.

2. The heating value and the composition of the gas must be known or determined.

3. The furnace atmosphere under which the furnace is to operate must be decided upon.

4. The quantity of flue gases per hour at the furnace operating temperature, corresponding to the input and atmosphere chosen, must be calculated† from the data secured in connection with items 1, 2, and 3.

5. The vertical distance, between the flue outlet and the working level or the point at which the given furnace pressure is desired, must be secured.

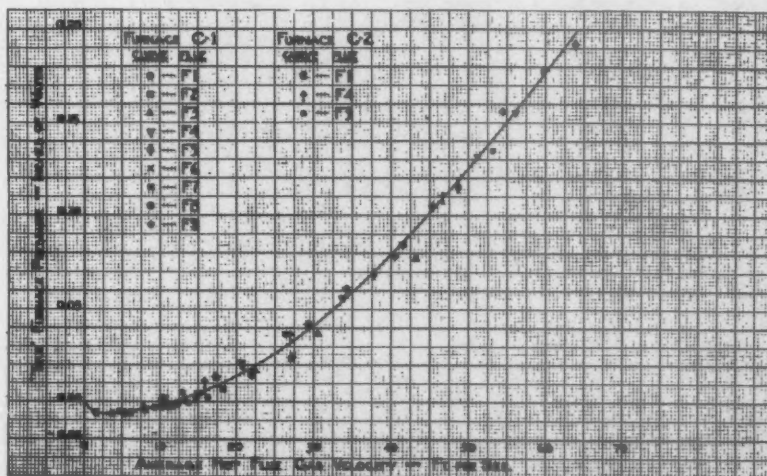


Fig. 7

Relationship between "true" furnace pressure and average hot flue gas velocity

\* The formula for this important relationship is:

$$h_w = (9.64 \times 10^{-5}) V^{1.85}$$

$h_w$  = "motive" pressure, inches of water.  
 $V$  = average hot flue gas velocity, feet per second.

† A method of calculating the quantity of flue gases is given in "Combustion," 3rd edition, American Gas Association, Industrial Gas Series, also in the Appendix of Bulletin No. 685, "A Study of the Characteristics of Burning Gas with Preheated Air," a research publication of the American Gas Association.

6. The draft pressure may then be calculated from the following formula:

$$h_c = 0.192 H \frac{B_s T_a}{B_a} \left[ \frac{q_a}{T_a} - \frac{q_c}{T_c} \right]$$

Where:

$h_c$  = static or "no flow" draft, inches water

$H$  = vertical distance between the point of measuring furnace pressure and the top of flue (outlet of flue gas), feet

$q_a$  = density of air at 14.7 pounds per square inch and 60 degrees Fahrenheit, pounds per cubic foot

$q_c$  = density of flue gas at 14.7 pounds per square inch and 60 degrees Fahrenheit, pounds per cubic foot

$B_s$  = standard barometric pressure, 14.7 pounds per square inch

$B_t$  = average local barometric pressure, pounds per square inch

$T_a$  = standard absolute temperature,  $460 + 60 = 520$  degrees Fahrenheit absolute

$T_a$  = absolute temperature of air outside of furnace, degrees Fahrenheit absolute, and

$T_t$  = absolute temperature of flue gas, degrees Fahrenheit absolute

7. The "motive" pressure must next be determined by adding the desired furnace pressure (item 1) in inches of water to the draft pressure (item 6) in inches of water.

8. From Fig. 8, the average hot flue gas velocity must then be determined for the required "motive" pressure (item 7).

9. Finally, from the following equation, the total flue area can be determined:

$$F_a = \frac{Q_a}{3600 V}$$

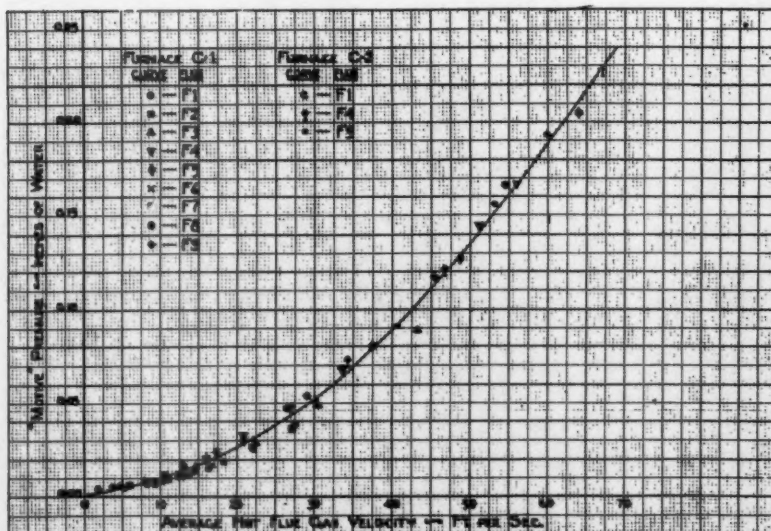


Fig. 8

Relationship between "motive" pressure and average hot flue gas velocity

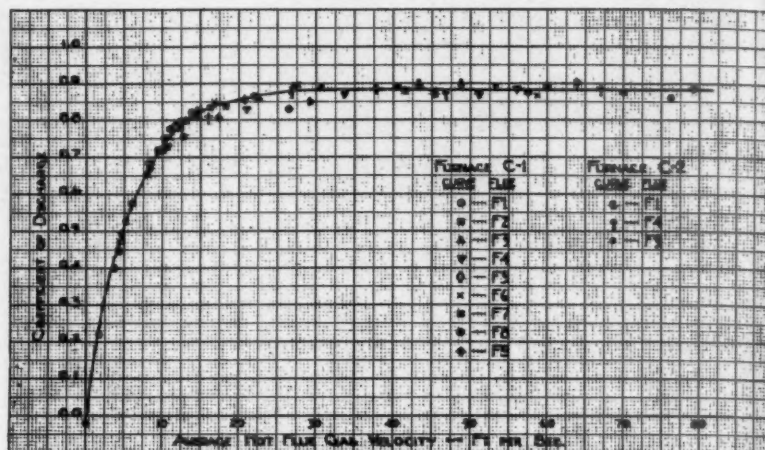


Fig. 9

Relationship between coefficient of discharge and average hot flue gas velocity

Where:

$F_a$  = total flue area, square feet

$Q_a$  = actual volume of hot flue gas at furnace temperature (item 4), cubic feet per hour

$V$  = average hot flue gas velocity (item 8), feet per second

NOTE: After determining the total flue area, it may be divided into any desired number of square or round flues to meet the requirements of the equipment.

Although the investigation of flues was conducted on a special size of test furnace, the analysis above outlined based on results secured with this furnace, may be applied to any furnace providing the following conditions exist:

(a) The friction through the flue is about the same as that of the test furnace and the friction within the furnace is negligible. If the total friction is greater than that encountered in the experimental furnace, the furnace pressure resulting from using the calculated flue area will be slightly higher than that desired.

(b) The flue is not connected directly to a chimney, as this would increase the friction very materially above that encountered in the test furnace.

(c) The furnace is either practically leak-proof or openings, such as door cracks, where not too large a percentage of the total flue area, are considered as part of the flue.

(d) The point of measuring the furnace pressure is far enough removed from the combustion zone that the velocity pressure is negligible in comparison to the static pressure. Otherwise, a correction, equal to the velocity pressure, must be applied to the measured or static pressure.

(Part II To Be Continued in August)

## Daniel C. Toal Dies in New York Hospital

DANIEL C. TOAL, purchasing agent of the Consolidated Gas Company of New York, died at Roosevelt Hospital, New York, June 17.

Mr. Toal was born in Brooklyn, N. Y., in 1878, and was educated in the public schools there. He joined the Consolidated Gas Company in 1923, in the executive department. He was made assistant purchasing agent in 1928, and was advanced to purchasing agent in 1930.

Mr. Toal was a member of the American Gas Association and the National Association of Purchasing Agents. His father, the late Daniel C. Toal, was editor of the *Gas and Water Review*. Mr. Toal leaves a widow and three daughters.

## TECHNICAL SECTION

J. A. PERRY, Chairman

H. W. HARTMAN, Secretary

O. S. HAGERMAN, Vice-Chairman

# Study Toward Solution of Breeze Problem in By-Product Coke Oven Plant\*

By R. E. Kruger

Rochester Gas &amp; Electric Corp.

THE purpose of this paper is to present a picture of what we, in Rochester, are doing to utilize breeze for purposes other than boiler fuel it being generally recognized that breeze is ordinarily consumed in boilers where it serves the purpose of a poor grade fuel.

We do not wish, in any way, to advance a lot of radical ideas or pipe dreams, but we welcome the opportunity to offer for your consideration the summary of an operating practice worked out by the members of our Gas Manufacturing Department. The writer wishes specifically to point out that this is not the work of an individual. It will be perfectly apparent to those familiar with coke plant ways, that this represents a cooperative effort of the highest order. It is with fullest appreciation of these facts in mind that the writer undertakes this dissertation and hopes you will find the data somewhat interesting and of value to your individual undertakings.

Since any breeze we send to our adjacent boiler plant only nets us \$1.70 a ton, it seemed there was plenty of room for improvement along the line of raising the value of this material, either directly or indirectly.

With this problem in mind we set out well over two years ago to decrease the amount of breeze to boilers.

First, already being aware of the practice of adding breeze to coal for carbonization as carried out by some coke oven operators particularly when making foundry coke, we experimented with small additions of breeze to our coal although we cater exclusively to domestic trade for our coke market.

It soon became apparent that such small quantities of breeze thoroughly mixed with the coal did not adversely affect the structure of the coke. As a matter of fact, coke structure was improved. We added various amounts of breeze of a variety of sizes and after a period of several months adopted the practice of adding 2.0 per cent of breeze to our coal. All of this preliminary work was done on a plant scale and the resulting coke closely watched and studied. Supervision, common sense and a simple system of handling and mixing the breeze, play an important part in this procedure. Since we carbonize about 1,000 tons of coal per day, we mix 20 tons of breeze per day with our coal. Our physical layout is such that the

breeze to be mixed with coal is collected in bins located immediately above our coal belt system, so that it is only necessary to feed the breeze by gravity onto our coal belt. As a consequence there is no handling charge for this portion of our breeze and since our resultant coke is at least as good as if no breeze were added to the coal we feel justified in assuming that we convert the added breeze into either producer fuel or coke sold for domestic purposes. It is, of course, perfectly evident that in case this practice of adding breeze to coal is not successful, it will resolve itself into a vicious cycle that can be soon recognized by the additional amount of breeze that accumulates in a plant of this size. Conversely the absence of such additional amounts spells success. Also after rather a short time it becomes perfectly

evident that the breeze added to the coal is converted to salable coke, for there is a limit to the amount of breeze we can add to our producer fuel.

In this work on breeze mixing with coal we experimented with amounts ranging from 1/2 per cent to 5.0 per cent and sizes ranging from all through 3/8" square to all through 1/16" square mesh screen. It does not take long to realize that breeze must be small and fairly dry and the mixing with the coal must be thorough.

Table I shows in detail the composition of the breeze added to our coal. This table, by the way, is representative of our general practice and does not represent a test condition. Table II covers the chemical analysis of the breeze added to our coal.

Those who might be interested in coal screen tests we would refer to Table III. It is immediately evident that we do not crush to small sizes. Incidentally we have a hunch that by finer crushing or pulverizing we could add more breeze. This,

TABLE I  
BREEZE SCREEN TEST

Date	On 10 Mesh	Through 10 Mesh	Through 16 Mesh	Through 30 Mesh	Through 60 Mesh	Through 100 Mesh	Through 200 Mesh	H <sub>2</sub> O
12/13/32	2.3	97.3	82.5	58.9	27.3	13.1	7.4	3.2
12/16/32	4.6	95.3	75.1	46.8	17.1	7.3	3.9	2.7
12/19/32	3.6	96.3	78.2	53.2	23.5	11.8	7.1	3.8
12/21/32	1.4	98.5	86.7	61.8	24.9	10.4	5.2	1.8
12/23/32	2.5	97.4	80.6	51.9	20.5	9.8	5.5	2.2
12/27/32	2.7	97.3	82.5	58.0	25.2	11.5	6.1	1.8
12/29/32	2.3	97.7	81.8	56.3	24.3	11.7	6.6	3.8
1/4/33	3.1	96.9	80.3	52.4	20.6	9.4	5.3	3.1
1/6/33	2.7	97.2	79.5	49.8	18.2	8.3	4.6	3.0
1/11/33	2.3	97.7	81.8	54.0	21.3	9.7	5.6	2.8
1/13/33	4.0	96.0	76.8	49.1	19.9	9.5	5.3	2.6
1/16/33	6.9	92.9	72.1	44.6	17.3	8.1	4.6	3.2
1/18/33	4.0	95.9	76.3	50.0	20.4	10.2	6.1	5.0
1/20/33	2.2	97.4	77.5	50.3	20.1	9.5	5.6	5.1
1/24/33	1.7	98.3	82.3	54.4	20.9	9.2	5.0	3.4
1/26/33	2.2	97.8	78.6	51.7	21.5	10.3	5.7	3.1
Average	3.0	96.9	79.5	52.7	21.4	10.0	5.6	3.2

TABLE II  
ANALYSES OF COKE BREEZE ADDED TO COAL

Date	% Vol.	% Ash	% F. C.	% S	F. Pt. Ash	B.t.u./Lb.
12/13/32-12/20/32	3.0	10.1	86.9	0.86	2510	12740
12/21/32-12/27/32	1.4	10.4	88.2	0.82	2360	12689
12/29/32-1/4/33	1.3	10.1	88.6	0.81	2400	12740
1/5/33-1/13/33	1.5	10.1	88.4	0.78	2400	12740
1/16/33-1/20/33	1.7	10.4	87.9	0.91	2340	12689
Average	1.8	10.2	88.0	0.84	2402	12720

\* Paper submitted before A.G.A. Joint Committee Conference of the Production & Chemical Committees, Hotel New Yorker, New York, N. Y., May 22, 1933.

TABLE III  
GAS COAL SCREEN TEST  
(Does not include Breeze)

Date	On 2"	On 1 9/16"	On 1 1/4"	On 7/8"	On 1/2"	On 3/8"	On 1/4"	On 3/16"	On 1/8"	Through 1/8"
12/20/32	3.6	5.8	13.9	6.6	16.1	7.3	10.2	5.1	5.8	25.6
12/21/32	2.7	4.1	12.2	5.4	20.3	9.4	9.4	5.4	6.8	24.3
12/22/32	11.4	7.1	14.3	8.6	15.7	8.6	8.6	4.3	4.3	17.1
12/23/32	8.0	17.0	22.0	8.0	14.0	6.0	6.0	3.0	3.0	13.0
12/24/32	4.0	12.0	16.0	10.0	17.0	8.0	7.0	4.0	4.0	18.0
1/1/33	11.0	14.0	18.0	6.0	20.0	7.0	7.0	4.0	4.0	9.0
1/2/33	3.0	10.0	14.0	7.0	21.0	8.0	11.0	6.0	6.0	14.0
1/3/33	9.0	12.0	20.0	7.0	17.0	7.0	7.0	4.0	4.0	13.0
1/4/33	8.0	10.0	14.0	5.0	18.0	7.0	8.0	5.0	6.0	19.0
1/5/33	5.0	11.0	22.0	6.0	19.0	7.0	7.0	3.0	3.0	17.0
1/6/33	11.0	20.0	23.0	6.0	12.0	4.0	6.0	4.0	3.0	11.0
1/7/33	7.0	17.0	29.0	7.0	14.0	5.0	5.0	2.0	2.0	12.0
1/15/33	6.0	16.0	18.0	7.0	14.0	7.0	7.0	3.0	4.0	18.0
1/17/33	7.0	10.0	13.0	5.0	12.0	4.0	5.0	3.0	3.0	17.0
1/16/33	5.0	12.0	14.0	7.0	14.0	7.0	8.0	4.0	5.0	24.0
1/18/33	10.0	12.0	17.0	6.0	14.0	6.0	7.0	4.0	5.0	19.0
1/19/33	16.0	13.0	19.0	6.0	13.0	6.0	6.0	3.0	3.0	15.0
1/30/33	10.0	10.0	14.0	7.0	12.0	7.0	9.0	6.0	5.0	20.0
Average	7.7	11.8	17.4	6.7	15.7	6.7	7.5	4.0	4.3	17.0

(High volatile Pittsburgh Seam Coal—no mixing)

however, is still a conjecture since we have not such pulverizing equipment.

From the data presented so far it is evident that we must be willing to get along with a slightly lower gas yield (really very little decrease) and have a market at a fair price for the additional coke made in order that the practice of adding breeze to coal will be advantageous. I hesitate to give prices, because an operator can readily insert his own figures and establish his spread.

In our case we are not hampered by the very slight decrease in gas yield and we have a ready market for the additional coke, and so we shall continue to operate on this basis, until conditions change to a point where nothing can be gained by the practice.

After all, the amount of breeze that can be added to our coal is only a small part of the breeze made per day, so naturally one looks for other outlets.

It so happened that about two years ago we were faced with the necessity of purchasing range nut coke sized 7/8" x 5/8". We got tired of buying this after a time and undertook to recover it from our run-of-oven production, but to crush coke to produce this small size meant incidental additional breeze. Since our producer fuel contained this size we set about to recover it and have been doing so ever since. This practice, however, meant one of two things

TABLE IV  
PRODUCER FUEL SCREEN TESTS

Date	New House (2)						Old House (1)						Tons	H <sub>2</sub> O
	On 3/8"	On 1/2"	On 3/4"	On 1"	Through 1 1/8"	Tons	On 3/8"	On 1/2"	On 3/4"	On 1"	Through 1 1/8"	Tons		
12/17/32	13	13	29	13	32	88	1.0	14	20	37	9	20	89	1.0
12/19/32	22	22	31	6	19	19	1.0	24	17	24	7	28	80	1.0
12/20/32	21	17	27	8	27	87	1.0	26	13	26	11	24	78	1.0
12/21/32	13	16	34	9	28	77	1.5	15	12	30	11	32	83	1.5
12/22/32	43	21	18	6	12	81	2.0	12	15	34	11	28	76	2.0
12/23/32	15	18	32	10	25	69	1.0	12	12	30	11	35	75	1.0
12/24/32	16	14	31	11	28	74	1.0	28	17	32	10	23	68	1.0
12/27/32	18	18	29	9	26	71	1.0	15	11	26	11	37	77	1.0
12/28/32	15	17	29	9	30	71	1.0	13	13	28	11	35	71	1.0
12/29/32	18	16	26	11	29	68	1.0	15	15	30	12	28	65	1.0
12/30/32	35	15	25	7	18	62	1.0	13	13	30	13	31	62	1.0
12/31/32	16	12	20	12	40	64	1.0	17	16	34	10	23	65	1.0
1/3/33	44	19	21	5	11	68	1.0	15	11	27	11	36	85	1.0
1/4/33	18	18	32	11	21	75	1.0	16	12	28	10	34	70	1.0
1/5/33	8	13	25	17	37	77	1.0	17	13	31	9	30	77	1.0
1/6/33	26	23	35	6	10	76	2.5	9	6	31	12	42	74	2.5
1/7/33	33	22	22	6	17	68	1.5	15	18	30	10	27	80	1.5
1/9/33	42	20	15	8	15	74	1.5	9	15	30	12	34	72	1.5
1/10/33	13	25	33	8	21	82	1.0	8	10	30	12	40	70	1.0
1/11/33	12	12	30	12	34	76	2.0	13	11	31	11	34	73	2.0
1/12/33	9	12	30	12	37	74	1.5	9	14	33	11	33	77	1.5
1/13/33	14	17	34	7	28	70	2.0	11	13	29	11	36	74	2.0
1/14/33	16	10	26	10	38	68	2.0	15	13	29	11	32	73	2.0
1/16/33	33	8	18	8	33	72	2.0	13	13	30	14	30	77	2.0
1/17/33	15	15	28	13	29	68	2.5	12	12	31	12	33	74	2.5
1/18/33	4	24	40	12	20	75	4.5	16	11	26	11	36	72	4.5
1/19/33	4	12	36	12	36	75	2.5	22	19	30	7	22	67	2.5
1/20/33	19	17	34	6	24	75	2.0	15	12	29	10	34	75	2.0
1/23/33	11	8	23	8	50	70	2.5	17	15	27	8	33	74	2.5
Average	20	16	28	9	27	74	1.6	15	14	30	11	31	74	1.6

- (1) 8'-6" Kerpelly Producers built in 1917  
(2) 8'-6" Kerpelly Producers built in 1926

—the amount of this size coke taken from our producer fuel had to be replaced either by larger size coke of which we had plenty, or it would have to be replaced by breeze of which we also had plenty. As far as supply was concerned we could do either, but if we made up the difference with larger size coke we hadn't gained anything, except we need no longer purchase the range nut size. If we made up the difference by additional breeze in our producer fuel and could use such a mixture successfully in our producers we would automatically transfer fuel from the boilers to our producers, thus liberating the equivalent as salable coke.

That is exactly what we did and are doing, except that we have further cut down on the top size of our producer fuel, thus again liberating additional coke for sale. We have carried this far enough to be sure we can operate producers successfully on fuel as represented by the data shown in Table IV.

Our experience over a period of years has taught us one very important thing, namely the more nearly a producer fuel approaches a uniform size, the more satisfactory it can be used, regardless of the size within, of course, certain limits. We are not yet at the point where we can use fuel all through 1/4", although we feel quite sure a fuel passing through 1/4" with only a minimum say of 10 per cent through 1/8" would make a satisfactory fuel.

We have found it difficult to satisfactorily use a fuel made of a variety of sizes, for example if we were to add to our producer fuel, as represented by Table IV, a fair portion of stove coke we would consider that addition lost fuel because a very large part of the large coke would come out in the ash. We are not sure we know the reason for this. With us it is an impression based on observation not a theory.

In digesting the data in Table IV one must not pass too lightly over the column showing the moisture content of our producer fuel. Experience has taught this to be a very important factor in determining how much breeze we can include in our fuel. It is easy for us to control this moisture, because of our dry quenching equipment. Incidentally there may be cases where operators not equipped with a dry quencher may find it worth while to consider drying equipment for their producer fuel.

We have no difficulty in using the type of producer fuel represented by Table IV. Our fires are "heavier" naturally because of the denser fuel beds. This means more blast pressure. Fires have to be "spaded over" more frequently, but this involves no extra man power in our producer houses. The matter of putting fuel in the bunkers has to be watched rather carefully, so as not to get segregation—uniformity of size enters the picture again.

Our throughput averages 20 tons per producer per day with a maximum of 28 tons per producer per day and our producer fuel for carbonization averages 234 lbs. per ton of coal. The matter of breeze handling in

the plant is a fascinating one. It can resolve itself into the passive act of carting it to the boiler plant and undoubtedly there are plants where that is the best practice. Again it can be carried out as we have outlined and resolve itself into either a favorable cycle or a vicious cycle of operation either of which can soon and readily be recognized.

In case it resolves itself into a favorable cycle the economics are decidedly worth while by reason of having a ready market for the additional coke at a fair price.

Another feature lies in the fact that the portion of breeze most desirable for addition to the coal is that portion least desirable as a constituent of producer fuel. I refer to the breeze through 1/8".

Still another vital factor in breeze handling lies in the act of producing breeze in the first place. Obviously the smaller the amount produced the smaller the amount to be handled. This is so axiomatic that it is overlooked in many of our phases of coke handling.

We wish to point out here that the personnel of the coke sales department have an appreciable bearing on this problem of breeze production, because they are the

ones who control coke sizes to domestic consumers and by allowing a tolerance of sizing they can readily enable the plant operator to get along with less crushing and consequently less breeze production.

In our particular operation another axiom is perfectly apparent namely; never handle coke more than necessary for every handling converts some \$6.00 coke to a \$1.70 breeze and costs money for labor and for maintenance of equipment. The method of handling coke involves many factors, all of which cost money and many of which pay no returns.

In conclusion specifically what have we accomplished? We know of no better way of stating it than to say we have reduced our breeze to boilers from an average of 1,000 tons per month in 1929 before we undertook this work to 140 tons per month average for the past five months and we have confidence we can maintain this type of operation. There is no accumulation of breeze in our plant, indicating beyond doubt the practice is not a vicious cycle. In addition we have marketed during the past fifteen months over 7,000 tons of range nut coke recovered from our producer fuel and used largely breeze as a substitute.

## Many Attend Joint Conference of Production and Chemical Committees

THE Joint Committee Conference of the Production and Chemical Committees, held at the New Yorker Hotel, New York, N. Y., May 22 and 23, brought together approximately 300 engineers and chemists, whose enthusiastic reception and discussion of the two-day program spoke eloquently of their appreciation of such conferences.

When it is remembered that this was a committee conference, and not a general conference, and that notices were confined to gas company executives who were invited to send such delegates as their policy permitted, the large attendance may also be considered a reflection of the executive appreciation of the value of these conferences.

A geographical analysis of the attendance shows how wise was the selection of an Eastern Seaboard City for the location of the Conference. Approximately 148 of the delegates came from New York City, Brooklyn, Long Island, Jersey City, Newark and vicinity. Philadelphia contributed thirty-

eight delegates; Chicago sent nine. The rest included representatives from Pennsylvania, New York State, the New England States (15); Maryland and the District of Columbia (10); Wisconsin, Minnesota, Michigan, Indiana, Virginia and Canada.

Mr. Perry received a great many congratulations for his untiring efforts to secure approval for the partial resumption of the conferences. A great deal of credit is also due to the Program Committees of the Production and Chemical Committees for the splendid arrangements.

The unexpectedly large attendance resulted in a shortage of copies of various papers presented at the Conference. Reprints of the following papers are being made at A.G.A. Headquarters in order to supply requests:

"The Use of Unfluffed Ores for Dry Purification"—C. O. Schobel; "New Ideas on Gas Purification and Ammonium-Sul-

(Continued on page 302)



Production and Chemical Committee Conference in session at Hotel New Yorker, New York City

# The Application of Pipe Coating and Corrosion Research to Southern Soils\*

## I. Introduction

THE studies of soil corrosion which are being carried out by the Bureau of Standards originated with the Bureau's work on electrolysis. It was observed that many pipe lines were often badly corroded when it was certain that they had never been subject to stray current electrolysis. In order to investigate the corrosiveness of soils and to determine the merits of various pipe materials, specimens of the various pipe materials were accordingly buried in 47 locations, distributed over the United States. The specimens were buried so that they could be removed at intervals of two years over a period of ten years. Additional bare and coated pipe specimens have been buried at various times and some 43 additional locations have been added to the original 47 locations. This work was started in 1922. In 1928 the American Petroleum Institute placed a Research Associate at the Bureau of Standards and one year later the American Gas Association did likewise. Both the A. P. I. and A. G. A. Research Associates have prepared and buried short pipe lengths coated with the more common types of coatings. The A. P. I. tests also include coatings applied to operating oil lines. A large percentage of these burial locations are in the Southern States.

At the present time nearly all the original Bureau specimens have been removed and the loss of weight and depth of pits on each specimen have been determined. Considerable data have also been collected on many of the so-called corrosion resistant materials and on various metallic protective coatings. The coatings on operating lines have been inspected twice and two of the original four sets of A. G. A. specimens which were buried at each of 14 locations have been removed and examined. Nearly all interested organizations, including pipe and coating manufacturers, oil, gas, electric, and water companies, have assisted in these tests by either furnishing material, funds, labor, or burial locations. It is not the purpose of this paper to present or discuss all of the results that have been obtained from these cooperative tests, but rather to attempt to interpret these results and other results that have been obtained from field and laboratory work in terms of advice or suggestions which may be of use to the gas industry. Those of you who are interested in further details should consult the reports of the Bureau of Standards and of the American Petroleum

Institute. The 1933 Report of the Subcommittee on Pipe Coatings and Corrosion, which may be obtained from A. G. A. headquarters, gives the essential details of the A. G. A. work on pipe coatings. This paper is partly a repetition of the Subcommittee Report.

## II. The Soils of Southern United States

The climate of the Southern States is characterized by heavy rainfall and moderately high temperatures. Since the climate under which soils are developed has a very great influence on the physical and chemical characteristics of the soils, the climatic conditions peculiar to the South are manifested in the properties of southern soils. The warm climate prevents the accumulation of any large amount of organic matter in the well-drained soil and the heavy rainfall has long since removed all the soluble and difficultly soluble material such as lime and magnesia. In those soils which have reached an approximately stable condition in this climate, the continued washing of the soil has developed a rather high accumulation of soil acids. These acids are not soluble and may be neutralized with alkalis such as lime, but they tend to accumulate rather than to disappear on continued leaching and weathering.

In general, the soils of this region have relatively bright colors—reds and yellows. They have high electrical resistivities and often have heavy textures—clays and clay loams—in which case they usually contain considerable acid. Of course there are poorly drained mucky areas where the soils are dark colored and there are local conditions which produce local variations in the soils. But the well drained, mature soils have the characteristics which have been described.

## III. The Corrosiveness of Southern Soils

The work of the Bureau of Standards has shown that the amount of acid in the soil is closely related to its corrosiveness. Since acidity is usually associated with soils that are heavy in texture, wherever a soil in the South is well developed or weathered and heavy in texture, one might expect corrosion. The inspections that have been made by the Bureau of old pipe lines in the South tend to confirm this statement. The corrosion is not of the extremely rapid and very destructive type which is found in occasional hot spots in western soils. It is more generally distributed over the entire line. This corrosion has not caused any great alarm because most of the old gas pipes are cast iron. Cast iron corrodes at about the same rate as steel but is considerably thicker and the graphitic corrosion products and the soil around the pipe

will confine the low-pressure gas even though the pipe is corroded through in places. If bare steel pipes and higher pressures are used, there are many southern soils in which failures from corrosion can be expected to occur although the leaks may not begin to appear until ten or fifteen years after the line is laid.

The problem of outlining the corrosive areas in cities, and thus determining where coatings are necessary is complicated by numerous factors. The leveling operations which have taken place in many cities have so disturbed the soil that only occasional remnants of the original surface remain. Pipes are either laid in soil which was far below the original surface and so is not weathered to the stable condition of the surface soil, or the pipes are laid in filled ground which may be almost anything. Any practical method for predetermining the corrosiveness of the soils under such conditions would have to be based largely on corrosion experience or numerous soil tests. To attempt to outline a general method for recognizing the corrosive soils by their appearance is almost hopeless. By inspection of old mains where they are uncovered, and by a knowledge of where he has had the most trouble, the engineer will become familiar with the local conditions and will be able to solve the local problem. About all that we can hope to do in this paper is to describe in a general way the types of soil which are likely to be so corrosive that some type of protection is advisable and to describe the soils in which protection is not likely to be necessary. Most clay soils and all poorly drained mucky soils and tidal marshes are sufficiently corrosive to justify the use of a coating. In well-drained sandy soils coatings are generally unnecessary.

The above statements do not imply that coatings are necessary wherever corrosion occurs. The use of a protective coating is justified only if it will extend the life of the pipe sufficiently so that the annual charge on the line is reduced. As the corrosiveness of the soil increases the operator is justified in spending more for a protective coating, or, what amounts to the same thing, the higher the corrosiveness of the soil the greater the gain that will result from the use of a coating.

The occurrence of stray railway currents in cities tends to complicate the matter even further. If the electrical conditions are such that the pipe is discharging current into the soil or might be subject to discharge in the future the use of any protective coating will localize the discharge at a few points where the coating has weak spots or pinholes. The chances are that any coating will have a few holes somewhere and the smaller the exposed area

\* Report of Subcommittee on Pipe Coatings and Corrosion, American Gas Association, prepared by Dr. Scott Ewing, Research Associate at the United States Bureau of Standards.

the higher the discharge rate at the holes. This rapid attack will soon penetrate the pipe wall. On the other hand, a good coating in the places where the pipe is collecting current will indirectly reduce the discharge rate at the anodic (positive) area. If it were possible to tell before the pipe were laid just where it will collect and discharge, the proper practice would be to coat at the cathodic (negative) areas and leave it bare where it may be anodic (positive) part or all of the time. The best practice is to leave the pipe bare wherever it is thought electrolysis trouble might be expected and if the soil is corrosive to bed the pipe in sand and backfill the trench with sand.

#### IV. The Choice of Coatings

It is not particularly difficult for any engineer to build a bridge, for example, which will support the load it is intended to carry. Similarly it is not particularly difficult to devise and apply a coating which will protect the pipe. The difficult thing is to build a bridge or design a coating which is economically feasible.

There are some coatings in the A. G. A. test which afford so little protection that it is doubtful if their use for extending the life of pipe lines is ever justifiable. On the other hand there are coatings in the test which so far show no indication of failure. Then there are coatings which afford considerable protection but which show, by the various tests and inspections, evidence of failure or deterioration. Most of these coatings have so far prevented pitting in most soils; some of them have entirely prevented pitting. No doubt there are practical cases where a coating which affords only moderate protection is the most economical coating.

It therefore seems advisable for the subcommittee to interpret the results so far obtained in the test into recommendations for a few soil conditions. These recommendations are based upon the data from the test and the experience of subcommittee members. The data are by no means adequate, the test is not yet completed and later observations may show that some of these recommendations may have to be modified. However, it is believed that many operators who have had only limited experience with coatings will find the recommendations of considerable value.

**Cinders, rocky or gravelly soil.**—Cinders are very corrosive so that in practically any case it would be foolish to lay a bare pipe in this "soil." On the other hand, gravelly or rocky soil is often only moderately corrosive and so may not require any coating. But if the coating is used, the considerations which govern its choice are essentially the same in either of these soils. The sharp cinder fragments tend to force themselves through the coating and the dropping of large stones on a coated pipe will chip off any of the enamel coatings. A so-called simple coating or soft coating is entirely inadequate for such conditions. The best protection will be afforded by an asbestos

felt reinforced coating. A coal tar base bitumen which in general is more resistant to moisture penetration than asphalt will have an advantage over an asphaltic bitumen in that it will prevent the extremely corrosive water from reaching the pipe. A rag felt or a heavy cotton reinforced asphalt coating will protect the pipe for three years at least and might be more economical than the asbestos reinforced coatings.

**Tidal marshes** have only a very slight tendency to puncture the coating because of their soft, semi-liquid consistency. Organic fabrics seem to be preserved in the salty water so that they function as well as asbestos felts. Either heavy reinforced or hard enamel coatings are capable of affording lasting protection in this kind of soil, but a pinhole or holiday in the coating will almost certainly result in rapid penetration of the pipe wall. The operator can feel his line is safe with any of the above coatings in this soil if he feels sure he obtained a continuous coat when the pipe was buried. Cathodic protection may prove particularly helpful in such soils.

**Poorly drained muck soils** differ from tidal marshes in that the organic fabrics are rapidly decomposed in these soils. The muck soils in the A. G. A. test seem in some way to cause a deterioration of asphalt in these soils. For this reason, other things being equal, coal tar base materials are preferable to asphalt base materials. Except for these considerations, the problem in muck soils is much the same as tidal marshes.

In **poorly drained clay soils**, where corrosion is often severe the only bituminous coating which is likely to give lasting protection is asbestos felt with coal tar enamel. The simple coatings will probably be penetrated by the shrinking and swelling of the clay soil, the organic fabrics will be rotted and any small hole in the coating is likely to develop into a deep pit on the pipe.

In **well-drained clay soils** or any well-drained natural soil, the appearance of a pinhole in the coating is not nearly as serious as it is in poorly drained soils. Pits will no doubt develop under some of the coatings in this soil, but the oxidation of the ferrous hydroxide when it leaves the pit will tend to seal pits or at least slow down the rate of pitting. In this kind of soil, if it is reasonably corrosive, almost any type of reasonably good coating will probably justify its use. The simple coatings, however, will be penetrated more readily or pulled off the pipe by the mechanical action of the soil as it shrinks and swells with changes of temperature and moisture content.

**Well-drained sands, sandy loams, or silt loams** often require no coating. But where the corrosiveness of the soil justifies the use of a coating, either asbestos or thick organic reinforced coatings or enamels can be expected to give considerable protection.

In all of the above-described soils the best type of coating from the standpoint of protection is the asbestos reinforced coating.

There may be cases where a more substantial coating than any of those in the A. G. A. test, could be economically used, as for example, where a high-pressure transmission main passes through a congested city. A single corrosion failure may cost the gas company more than the coating on the entire main. A double wrapping of organic reinforcement with a substantial thickness of bitumen between the layers of fabric may afford even better protection than a single layer of asbestos felt. The A. P. I. tests include some of these heavier coatings and the results show that the double wrapping adds materially to the protection. The A. G. A. tests show that the inner layer of fabric in a double wrapped coating lasts much longer than the outer layer before it begins to decompose.

In the construction of a pipe line or in the use of coatings in a distribution system, it is not the intention of the subcommittee to recommend the use of a large variety of coatings. One or two types which are best adapted to the soil conditions and are economically justifiable should be chosen. The men will become familiar with the peculiarities of the material and skilled in its application.

But whether any coating or no coating is used the distribution engineer should take advantage of every opportunity to learn all he can about the condition of his mains and services. He will thus soon learn where to expect corrosion trouble and if he uses coatings he will learn something of their behavior and values.

#### V. Recent Developments in Pipe Protection and Plans for Future Work

The Bureau of Standards has already done considerable work in developing methods for determining the corrosiveness of the soil. The so-called Shepard Soil Resistivity Meter is one of the products of this work. These canes are a simple and sufficiently accurate instrument for measuring the soil resistivity. They have been found by many gas and oil companies to be of great value in locating corrosive soils. They are especially useful in the West and Southwest where the corrosiveness of the soil is caused principally by the soluble material it contains.

The determination of the total amount of acid in the soil has been found to give a very good indication of the corrosiveness of southern and eastern soils. This method for determining the corrosiveness of the soil has not been adopted by either the oil or gas industry, probably because of lack of familiarity with the methods for making the determination.

The soil maps which are made by the United States Department of Agriculture have been used by some oil and gas pipe line engineers to help determine where the corrosive areas are.

During the summer the A. G. A. Research Associate will work on old operating lines whose corrosion history is known, with the object of devising simple and accurate methods for locating corrosive areas.

It is hoped that as a result of this work it will be possible to make definite recommendations as to the most practicable means for locating corrosive areas. The problem is of fundamental importance in the economical use of protective coatings.

Since corrosion is an electrochemical phenomena, a galvanic current is always associated with corrosion. When a pit is being formed on a pipe, current is discharging from the pipe into the soil at the pit and is returning to the pipe at some other point which may be very near the pit or may be several miles from it. If the electrical conditions can be so fixed that no current flows from the pipe into the soil, corrosion will be very greatly reduced if not entirely stopped. The current will be prevented from leaving the pipe if the electrical potential of the pipe is reduced so that it tends to collect current everywhere. It would be necessary to draw an enormous current from a bare pipe line in order to reduce its potential sufficiently, but if the pipe is covered with a coating having a relatively high electrical resistance it is economically feasible to lower the potential of the pipe. This method of protecting a coated pipe line, by making the pipe collect current at the few points where the coating is broken has been used on a high pressure line in New Orleans for three years. It is now being used in several other places and wherever it has been tried it has so far given very good results. This method of protection is a decided forward step. Within the next few years the use of cathodic protection will no doubt increase. It has its limitations, of course, and it cannot be used everywhere, but it is probable that it could be used in many places where it is not now being used. Mr. R. J. Kuhn of New Orleans, who has used this method rather extensively, intends to prepare a report on this subject during the coming year.

Although concrete coatings have long been recognized as one of the best means of protecting pipe lines, the committee has so far made no studies of these coatings. One of the principal faults of this type of coating is the difficulty and expense of applying it properly. The methods of application are being rapidly improved. One large oil company has developed a satisfactory method of applying concrete and is using it entirely on all reconconditioning work. Within the next year or two we can expect further improvement in the methods of applying these coatings, and their use will probably increase considerably.

One of the serious corrosion problems of the average gas distribution engineer is the corrosion of services. This is one of the problems that the subcommittee has under consideration for the next year. If there appears to be any method for attacking this problem which will result in worth while savings to the industry, it will in all probability be given the attention it deserves.

The American Gas Association's Committee on Pipe Coatings and Corrosion is

desirous of being of the greatest possible assistance to engineers with specific corrosion and coating problems. Inquiries on such problems are welcome and will receive prompt consideration by the committee from the standpoint of the data available to them. In this way it is hoped to make the results of the work of the greatest practical advantage to the membership.

#### VI. Summary

The investigation of underground corrosion, which is being carried out by the Bureau of Standards in cooperation with practically all interested industries, has shown, among other things, that the corrosiveness of the soil is related to the electrical resistivity of western soils and to the total acidity of eastern soils.

Southern soils are nearly all acid in reaction and their corrosiveness is determined largely by their total acidity. Acidity is associated with heavy clays or with accumulations of organic matter.

The work of the Subcommittee on Pipe Coatings and Corrosion of the American Gas Association has resulted in recommendations for the choice and use of coatings which are given in this report.

During the next year the principal work of the American Gas Association's Research Associate will be to develop rapid methods for determining the corrosiveness of soils along a proposed pipe line route.

The most significant recent improvements in the methods of protecting pipe lines is through the use of cathodic protection and the development of better methods for applying concrete coatings.

### 100 Gas Executives Attend Chicago Ceremony

(Continued from page 270)

people themselves from the sale of a book of tickets for \$5 which entitles the holder to ten admissions to the Fair.

The remainder of the \$30,000,000 has come from sources hitherto untapped in the staging of great exhibits. There was originally floated a \$10,000,000 bond issue secured by 40 per cent of the gate receipts and guaranteed by a small group of individuals whose names have never been revealed. Of these bonds, \$7,000,000 are outstanding, the Exposition having received cash for that amount. There remain \$3,000,000 of unissued bonds, of which \$2,000,000 have been subscribed to, and the balance is being absorbed by manufacturers and contractors in exchange for services rendered.



*Fox air conditioning furnace in stranstee model home at Chicago fair*

The buildings of A Century of Progress have been erected out of the proceeds of these bonds, and not a pile has been sunk that was not paid for. In addition, several corporations have erected their own buildings. The cost of these individually sponsored pavilions plus the purchase of exhibit space has amounted to \$6,000,000. Contracts to the tune of \$5,000,000 have been made with concessionaires for the rights to furnish transportation, public conveniences, amusements, entertainment and refreshments. The Federal Government has appropriated \$1,000,000 for its own exhibit, and individual states are under contract for a total of \$2,000,000.

That is the audit of the \$30,000,000 Exposition. It includes no probabilities, and the bank balance of the Exposition has never fallen below \$1,000,000.

Sound management, economy, stable financing, a staff that has proved itself expert in meeting conditions, plus the unique and modern character of the enterprise, are factors that have made great industries, including the gas industry, throw the weight of their support behind this Exposition.

# Monthly Summary of Gas Company Statistics

FOR MONTH OF APRIL, 1933

Issued June, 1933, by the Statistical Department of the American Gas Association  
420 Lexington Avenue, New York, N. Y.

PAUL RYAN, Statistician

## COMPARATIVE DATA ON THE MANUFACTURED AND NATURAL GAS INDUSTRY FOR THE MONTH OF APRIL, 1933

	Month of April			Three Months Ending April 31		
	1933	1932	Per cent Change	1933	1932	Per cent Change
<b>Customers</b>						
Domestic (Including House Heating).....	14,295,200	14,875,100	— 3.9	<i>See April</i>		
Industrial and Commercial.....	958,400	983,400	— 2.5			
Total .....	15,253,600	15,858,500	— 3.8			
<b>Revenue (Dollars)</b>						
Domestic (Including House Heating).....	44,368,600	50,099,400	—11.4	193,103,400	210,028,300	— 8.1
Industrial and Commercial.....	15,388,400	17,470,600	—11.9	66,826,000	74,467,100	—10.3
Total .....	59,757,000	67,570,000	—11.6	259,929,400	284,495,400	— 8.6

## COMPARATIVE DATA ON THE MANUFACTURED GAS INDUSTRY FOR THE MONTH OF APRIL, 1933

<b>Customers</b>						
Domestic .....	9,279,000	9,740,800	— 4.7	<i>See April</i>		
House Heating .....	60,900	58,300	+ 4.5			
Industrial and Commercial .....	475,900	492,700	— 3.4			
Miscellaneous .....	7,700	7,800	—			
Total .....	9,823,500	10,299,600	— 4.6			
<b>Gas Sales (MCF)</b>						
Domestic .....	21,103,400	23,543,200	—10.4	84,575,100	92,437,000	— 8.5
House Heating .....	2,576,100	2,899,800	—11.2	12,611,600	12,973,300	— 2.8
Industrial and Commercial .....	6,606,800	7,428,200	—11.1	26,483,400	30,208,500	—12.3
Miscellaneous .....	172,800	185,800	—	716,700	758,200	—
Total .....	30,459,100	34,057,000	—10.6	124,386,800	136,377,000	— 8.8
<b>Revenue (Dollars)</b>						
Domestic .....	25,019,800	28,189,100	—11.2	100,107,200	110,515,100	— 9.4
House Heating .....	1,787,200	2,132,900	—16.2	8,533,900	9,567,900	—10.8
Industrial and Commercial .....	5,515,800	6,532,300	—15.6	22,969,400	26,780,100	—14.2
Miscellaneous .....	112,100	120,900	—	493,900	502,400	—
Total .....	32,434,900	36,975,200	—12.3	132,104,400	147,365,500	—10.4

## COMPARATIVE DATA ON THE NATURAL GAS INDUSTRY FOR THE MONTH OF APRIL, 1933

<b>Customers</b>						
Domestic (Including House Heating).....	4,955,300	5,076,000	— 2.4	<i>See April</i>		
Commercial .....	453,600	461,000	— 1.6			
Industrial .....	14,900	14,800	+ 0.7			
Main Line Industrial .....	4,600	5,100	— 9.8			
Miscellaneous .....	1,700	2,000	—			
Total .....	5,430,100	5,558,900	— 2.3			
<b>Gas Sales (MCF)</b>						
Domestic (Including House Heating).....	28,181,900	31,532,800	—10.6	136,809,300	144,608,500	— 5.4
Commercial .....	8,153,200	8,823,100	— 7.6	40,636,800	41,142,600	— 1.2
Industrial .....	26,345,300	27,644,300	— 4.7	106,658,900	114,511,400	— 6.9
Main Line Industrial .....	9,924,300	8,848,100	+12.2	42,601,600	37,568,200	+13.4
Miscellaneous .....	582,900	829,900	—	3,078,800	3,671,100	—
Total .....	73,187,600	77,678,200	— 5.8	329,785,400	341,501,800	— 3.4
<b>Revenue (Dollars)</b>						
Domestic (Including House Heating).....	17,561,600	19,777,400	—11.2	84,462,300	89,945,300	— 6.1
Commercial .....	3,670,100	4,277,300	—14.2	17,874,000	18,684,500	— 4.3
Industrial .....	4,963,500	5,385,900	— 7.8	20,283,800	23,366,900	—13.2
Main Line Industrial .....	1,021,600	1,029,000	— 0.7	4,644,600	4,508,800	+ 3.0
Miscellaneous .....	105,300	125,200	—	560,300	624,400	—
Total .....	27,322,100	30,594,800	—10.7	127,825,000	137,129,900	— 6.8

## Gas Utility Revenues Show Decline During April

REVENUES of the manufactured and natural gas industry aggregated \$59,757,000 for April, 1933, as compared with \$67,570,000 for April, 1932, a decline of 11.6 percent.

The manufactured gas industry reported revenues of \$32,434,900 for the month, a drop of 12.3 percent from a year ago, while revenues of the natural gas industry totalled \$27,322,100 or 10.7 percent less than for April, 1932.

Sales of manufactured gas reported for April totalled 30,459,100,000 cu.ft., a decline of 10.6 percent, while natural gas sales for the month were 73,187,600,000 cu.ft., a drop of 5.8 percent.

This decline in sales volume appeared to characterize most sections of the country, although not to the same extent. In New England, April sales were nearly 15 percent under a year ago, while in the Middle Atlantic States, the decline amounted to 10 percent. The curtailment in manufactured gas sales was also quite pronounced in the East North Central States. In Illinois, April sales were down 11 percent, while in Indiana the loss amounted to more than 12 percent.

The sales decline in natural gas territories was relatively less severe, the result in large part of some increase in industrial gas sales attending the improvement in general economic and industrial conditions during the month. In New York, sales of natural gas for industrial purposes increased nearly 25 percent, while in Ohio the gain in this class of business was 8 percent. In Kansas and Oklahoma the increase in industrial sales averaged 25 percent for the month.

## Gets McCarter Medal for Saving Chief's Life



L. K. Williams

**L**AFAYETTE K. WILLIAMS, assistant night superintendent of The Philadelphia Gas Works Company, Philadelphia, Pa., has been awarded the Thomas N. McCarter Medal by the American Gas Association for saving the life of Robert Barr, Jr., night superintendent, by applica-

tion of the prone pressure method of resuscitation.

Mr. Barr was attempting to close valves on connections between condensers and seal pots, seals having been broken and gas escaping, when he was overcome. Quick work on the part of Mr. Williams revived his chief and the latter required no further treatment.

The presentation of the medal to Mr. Williams was made at an inter-departmental meeting by P. T. Dashiell, vice-president of the Philadelphia Gas Works Company.

## Named A. S. A. Director

Dana D. Barnum, president of the Boston Consolidated Gas Company, Boston, Mass., has been elected to the board of directors of the American Standards Association.

The Century of Progress Exposition is three and one-half miles long, occupies 424 acres of land reclaimed from Lake Michigan, and there are 82 miles of corridors inside its 32 exhibit pavilions. In Gas Industry and Home Planning Halls there are more than 50,000 feet of exhibit space.

## The Competitive Situation in Commercial Sales

(Continued from page 288)

other competitive applications, would well be worth considering

### Summary

As I see this picture of competition brought about by the mechanical stoker as it particularly affects the home, large building, bakery, and process steam boiler, I think it represents a definite challenge to not only our local Gas Companies but to all natural gas companies and other gas companies as well. For years, we have been resting more or less snugly in our thought that our industry had broad fields of expansion in home heating and these other fields, content with the thought that as the public's standards of living increased it would demand the comforts of gas heating. Now, however, here is a new element in this set-up that to my mind actually challenges the expansion of the gas industry in these fields over that which now exists. Indeed, even if we do not effectively meet this situation, I think we may expect a diminution of the loads that we already have in these fields.

Thus, rather than experiencing a gradual broadening market for heating purposes, we may experience a diminishing market.

It is obvious therefore, that if my analysis of the situation is correct, we must do something about this competition. It must be evident that the longer we delay, the harder our job will be and the less successfully our efforts will be rewarded when they are adequate to meet the situation. I believe that if we start at once we have as good a chance of ultimate success in expanding our markets as we thought we had in the years just past.

In my opinion, if we only succeed in holding our gas heating load at its present level for the next few years, that is by replacing those jobs that we lose and have already lost by additional jobs, then we can feel that we are succeeding in meeting this competition. When more normal business conditions return, we can then expect the rapid expansion of our gas load that we had originally thought we would secure, and I can conceive that our load may be

expanded even more rapidly because we would have built up aggressive sales organizations whose momentum would rapidly increase when once started. If we admit or think that we are defeated in these fields, then we are really and truly beaten. Still, as long as we keep going, keep fighting and insisting that there is a place in our community for automatic gas heating, we will never face defeat or extinction.

## Many Attend Joint Conference of Production and Chemical Committees

(Continued from page 297)

fate Manufacture"—F. Denig; "Water Gas Committee Report"—L. J. Eck, Chairman (with its several contributions); "Notes on Dehydration of Heavy Oil Tar"—R. M. Kellogg; "A Study Directed Toward a Solution of the Breeze Problem in a By-Product Coke Oven Plant"—R. E. Kruger (Also Published Herewith); "The Use of Mixed Producer and Natural Gas for Underfiring at the Plant of the Chicago By-Product Coke Co."—C. R. Locke; "Underfiring a Coke Oven with Liquefied Petroleum Gas"—E. D. Maurer; "Reduction of Gas Works Steam Load by the Modernization of Transmission Pumping Equipment"—J. B. Boniface; "Determination of the Effect of Flue Gas Condensate on Metals and Alloys Used for Flue Pipes on Gas Fired Furnaces"—F. P. Mueller; "The Determination of Water Vapor in Gas"—Geo. E. Ludwig; "Notes on Sampling and Analysis of Coke"—J. G. Sweeney; "Review of Methods for the Determination of Dust in Gas"—L. Shnidman; "Laboratory Cracking Furnace for Heavy Oils and Gas Oils"—I. B. Dick; "The Accurate Determination of Heating Values of Gaseous Fuels"—E. X. Schmidt; "Gas Mixing at Syracuse"—H. K. Seeley.

One of the outstanding features of the Conference was the sustained interest shown by the delegates in the discussion of all the papers. Undoubtedly this was largely due to the timeliness of the subjects selected by the Program Committees. But to a degree at least this enthusiasm could also be traced to the fact that it was the first opportunity for the discussion of production problems since 1931.

Major Alexander Forward, managing director of the American Gas Association, in addressing the Conference, pointed out that while recent years had shown an unprecedented development in the extent of natural gas distributed, nevertheless since 1929 there had only been a 15 percent reduction in the manufactured gas produced in this country. When it is considered that practically half of this reduction was due to economic conditions, the continued need for production engineers and production conferences is readily apparent.

A reproduction of period kitchens of 1833, 1860, 1888, 1903, 1920 and 1933 feature A Century of Progress in gas cooking, now on display in Home Planning Hall at the Chicago Exposition.

# Associations Affiliated with A. G. A.

## Canadian Gas Association

Pres.—Hugh McNair, Winnipeg Electric Co., Winnipeg, Man.  
Sec.-Tr.—G. W. Allen, 21 Astley Avenue, Toronto.

## Empire State Gas and Electric Association

Pres.—Alfred H. Schoellkopf, Niagara Hudson Power Corp., Buffalo, N. Y.  
Chairman, Gas Section—A. M. Beebee, Rochester Gas & Electric Corp., Rochester, N. Y.  
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.

## Illinois Public Utilities Association

Pres.—Bernard J. Mullaney, The Peoples Gas Light & Coke Company, Chicago, Ill.  
Sec.—J. R. Blackhall, Suite 1213, 79 West Monroe St., Chicago, Ill.

## Indiana Gas Association

Pres.—R. S. Brunner, Indiana Gas Utilities Co., Richmond, Ind.  
Sec.-Tr.—P. A. McLeod, New Castle, Ind.

## Michigan Gas Association

Pres.—J. E. Spindle, Grand Rapids Gas Light Co., Grand Rapids, Mich.  
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.

## Maryland Utilities Association

Pres.—F. A. Mitchell, Eastern Shore Public Service Co., Salisbury, Md.  
Sec.—D. E. Kinnear, 803 Court Square Bldg., Baltimore, Md.

## Mid-West Gas Association

Pres.—R. L. Klar, Des Moines Gas Co., Des Moines, Iowa.  
Sec.-Tr.—Roy B. Searing, Sioux City Gas & Electric Co., Sioux City, Iowa.

## Missouri Association of Public Utilities

Pres.—Fred Karr, St. Joseph Gas Co., St. Joseph, Mo.  
Sec.-Tr.—N. R. Beagle, Missouri Power & Light Co., Jefferson City, Mo.  
Asst. Sec.—Jesse Blythe, 103 West High St., Jefferson City, Mo.

## New England Gas Association

Pres.—H. R. Sterrett, New Haven Gas Light Co., New Haven, Conn.  
Vice-Pres.—F. M. Goodwin, Boston Consolidated Gas Co., Boston, Mass.

Second Vice-Pres.—R. H. Knowlton, The Connecticut Light & Power Co., Hartford, Conn.

Treas.—F. D. Cadwallader, Boston Consolidated Gas Co., Boston, Mass.

Exec. Sec.—Clark Belden, 41 Mt. Vernon St., Boston, Mass.

Chairman, Operating Div.—P. R. Buchanan, Hartford Gas Co., Hartford, Conn.

Sec.-Tr., Operating Div.—D. R. Campbell, Portland Gas Light Co., Portland, Me.

Chairman, Sales Div.—H. B. Hall, Old Colony Gas Co., East Braintree, Mass.

Sec.-Tr., Sales Div.—R. J. Rutherford, Cambridge Gas Light Co., Cambridge, Mass.

Chairman, Industrial Div.—P. A. Nelles, Charles H. Tenney & Co., Boston, Mass.

Sec.-Tr., Industrial Div.—S. F. Morgan, New Bedford Gas & Edison Lt. Co., New Bedford, Mass.

Chairman, Accounting Div.—Leland Balch, Lowell Gas Light Co., Lowell, Mass.

Sec.-Tr., Accounting Div.—C. D. Perkins, Malden & Melrose Gas Light Co., Malden, Mass.

Chairman, Manufacturers Div.—C. H. Cummings, Industrial Appliance Co. of N. E., Boston, Mass.

Sec.-Tr., Manufacturers Div.—J. H. McPherson, James B. Clow & Sons, Boston, Mass.

## New Jersey Gas Association

Pres.—F. A. Lydecker, Public Service Electric and Gas Co., Newark, N. J.

Sec.-Tr.—G. B. Webber, Public Service Electric and Gas Co., Newark, N. J.

## Ohio Gas and Oil Men's Association

Pres.—L. K. Langdon, Union Gas & Electric Co., Cincinnati, Ohio.

Sec.-Tr.—Wm. H. Thompson, 811 First National Bank Bldg., Columbus, Ohio.

## Oklahoma Utilities Association

Pres.—R. J. Benzel, Southwestern Bell Telephone Co., Oklahoma City, Okla.  
Mgr.—E. F. McKay, 1020 Petroleum Bldg., Oklahoma City, Okla.

## Pacific Coast Gas Association

Pres.—Harry L. Masser, Los Angeles Gas and Electric Corp., Los Angeles, Calif.  
Mang. Dir.—Clifford Johnstone, 447 Surter St., San Francisco, Calif.

## Pennsylvania Gas Association

Pres.—F. M. Milward Oliver, The Philadelphia Gas Works Co., Philadelphia, Pa.  
Sec.—Frank W. Lesley, Pennsylvania Gas & Electric Co., York, Pa.

## Pennsylvania Natural Gas Men's Association

Pres.—F. F. Schauer, Equitable Gas Co., Pittsburgh, Pa.  
Sec.-Tr.—B. H. Smyers, Jr., 435 Sixth Ave., Pittsburgh, Pa.

## Southern Gas Association

Pres.—B. B. Ferguson, Portsmouth Gas Co., Portsmouth, Va.  
Sec.-Tr.—S. L. Drumm, New Orleans Public Service Inc., New Orleans, La.

## Southwestern Public Service Association

Pres.—Knox Lee, Southwestern Gas & Electric Co., Marshall, Texas.  
Sec.—E. N. Willis, 1801 No. Lamar St., Dallas, Texas.

## The Public Utilities Association of Virginia

Pres.—T. Justin Moore, Va. Elec. & Power Co., Richmond, Va.

## Wisconsin Utilities Association

Pres.—R. G. Walter, Wisconsin Power & Light Co., Madison, Wis.  
Exec. Sec.—J. N. Cadby, 135 West Wells St., Milwaukee, Wis.

International Gas Conference  
AND  
Fifteenth Annual Convention  
of the American Gas Association

Chicago, Ill.

Sept. 25-26-27-28-29, 1933

# Personnel Service

## SERVICES OFFERED

**Sales and merchandise manager**, with fullest appreciation of utilities' "public relations" problems. Familiar floor and house-to-house sales; also employees' campaigns; and profitable use of home economics department. Successful organizer. Trained on plan, copy, display—both in major and smaller household appliance. Complete details on request. 724.

**Heating Engineer**. Twelve years' experience, heating, ventilating, and plumbing engineering; designing, specifications and supervision. Industrial, commercial, school and residential air conditioning. College Graduate and licensed engineer New York and New Jersey. 725.

**Engineering graduate** (1928, leading university). Will receive M.S. degree in Mech. Engr. (gas major) in June. Four years' of varied experience on maintenance and operation of city plants of large utility. Married; age 29. 726.

**Accountant** (28) last two and one-half years large combination gas and electric company handling all phases of public utility accounting; previously three years on public utility staff of C. P. A. organization. University graduate, majored in accounting. 727.

Contact man for manufacturer of gas equipment, or gas company, experienced in gas heating engineering and sales, both natural and manufactured gas. Can organize department and train men. 728.

**Management or process development** work wanted. Have had responsible charge of large successful operating organizations. Particularly experienced in by-product coke, tar refining, and research. 729.

**Gas engineer** qualified for company management or supervision of operating procedure; practical specialist in high and low temperature carbonization including preliminary research. First class technical background with extensive operating and managerial experience. As plant results engineer for large property or holding company, could secure and maintain maximum efficiency with present equipment. 730.

**Sales Executive**: exceptional background, innumerable contacts, successful record merchandising gas, electric domestic, industrial service, appliances, training, and handling salesmen, advertising publicity, cost analyses, rate designing, public relations and general sales promotion; widely traveled expert negotiator, convincing personality, aggressive, tactful, creative, resourceful; can quickly visualize any situation and develop possibilities. 731.

**Qualifications arising out of eighteen years' broad auditing and accounting** experience in varied lines including five years, large combination property, plus special courses in accountancy, at disposal of manufacturer of gas and electric equipment or gas and electric corporation. Public work has rounded out customary utility experience thus creating a more valuable asset. 732.

**Wanted to make connection as Manufacturers Agent**, or with sales office, of concern manufacturing cast iron pipe and etc., or kindred lines such as valves or similar appliances. Can furnish record and details of past experience in these lines. 733.

**Salesman—appliances**. American. Keen merchandiser. Ten years' experience contacting public utilities, manufacturers, department and chain stores, real estate organizations, jobbers and retailers. Familiar sales promotion and missionary work and sales crews, house to house campaigns. (29) Single. Living Salary. 734.

**Technical graduate**, 1931, single, specialized in gas and chemical engineering, with experience in several industrial concerns, also in testing heating equipment at university experiment station, interested in development and experimental work, willing to go anywhere and to consider any position regardless of salary; now in the East. 735.

## SERVICES OFFERED

**Civil and Gas Engineer**. Experience covers design and construction of over one thousand miles of natural gas pipe lines; forty city distribution systems; six natural gas compressor stations aggregating ten thousand horse power. Good geologist and map maker. Executive experience, twelve years' chief engineer, five land agent, two purchasing agent. 736.

Seven years' new business manager of manufactured gas plant of 15,000 meters and three years' manager of natural gas property of 3,000 meters. Specialized training in gas heating. Would like to make a connection with a gas utility in supervisory or executive capacity; age 42. 737.

Can you use an experienced house heating salesman with recent successful sales record? Familiar with West and middle West problems; competent in both natural and manufactured gas utilization. Services available immediately. 738.

**Manager**, manufactured and natural gas and electricity. Experienced in new business, distribution and development of new territory. Can reestablish run-down properties and improve public relations. 739.

**Domestic coke service man** (35) technically trained. Thoroughly experienced in burning coke in small and medium sized furnaces, with background of research and position with one of the largest producers of domestic coke. Capable of handling service and customer contact department of a company; experienced in coke production and sales. 740.

**Gas engineer** (B.S., Chemical Engineering). Eight years' experience in operation of gas plants and by-product coke plants. Wide experience in development of new processes, design and construction of equipment and patent prosecution covering all phases of the gas industry. Desire responsible position in operating or engineering department. 742.

**Engineer** (M.E.) with seven years' practical experience as engineer and superintendent all departments (water gas, coal gas and natural gas operation) starting as cadet, desires position in engineering or operating capacity. Two years' experience with heavy oil. Single (30) willing to go anywhere United States or foreign service. 743.

**Gas and fuel engineer** with additional training in metallurgy and ceramics. Experienced in research and varied industrial fields involving application of heat. Employed last four and one-half years as research fellow in ceramics department of well known university. Will go anywhere in U. S. Married (28). 744.

**Engineer**; M.S. in M.E., major in Gas Engineering. Four years' operating and all-round experience including utilization engineering with large natural gas utility; married; (29); willing to go anywhere. 745.

**Sales executive—engineer**; university graduate. Seven years' blast furnace and coke plant operating experience followed by seven years' sales experience industrial gas combustion equipment, industrial furnaces, and heavy plant equipment—wishes position in equipment sales or industrial department of strong company. Married (36). 746.

**Manufacturing engineering executive**: technical education, desires connection with reliable gas range or appliance manufacturer. Formerly chief engineer of two well known gas range companies. Capable complete charge of development, experimental, laboratory, research departments. Understand vitreous enamel application from start to finish. 747.

**Gas engineer** with twenty years' operating and managerial record. Experienced heavy oil operation, reforming natural gas and mixing of manufactured and natural gases. Qualified in sales promotional work and industrial application of gas. Formerly research assistant, public utility management at well known graduate school. Open for permanent or temporary connection. 748.

## SERVICES OFFERED

**Sales engineer**—eighteen years' experience covers industrial steam boiler application, large volume water heating and management of house heating department in all its branches of service. Broad general and technical knowledge of all heat using industries; experience includes surveys, sales work, installation supervision and operating "follow up." Married. 749.

**Appliance salesman** capable of selling and handling any territory. Have ability to supervise salesmen, manage a stove department, create new business and equipped with knowledge of the stove business in general. Location secondary consideration. 750.

**Development and Sales Engineer** (M.E.) having eighteen years' gas and electric company, as well as large oil burner company sales experience. Established enviable record in electric and gas industrial sales and pioneered development and did much original work in central gas heating and air conditioning equipment. 751.

**Sales Engineer** with technical experience and with thorough knowledge of all branches of the gas business offers his services to company seeking representative for sales development work among gas and oil companies. Can produce results. This is a real opportunity to secure services of a high class man. 752.

**House heating engineer** (25) graduate of a gas engineering school, B.S. and M.S. with advanced work in heating and ventilating. Have two years' experience in house heating. Desire employment in either house heating or industrial sales work. 753.

Man well qualified by education and experience to head the Industrial Department of a large utility. Resourceful, creative, aggressive authority on industrial gas usage and technology. Useful in consulting capacity, reports clearly, in non-technical language. Responsible position sought. 754.

## POSITIONS OPEN

Nationally known manufacturer of water heaters has available territory open. Would like applicants to forward qualifications, experience, etc. relative to same. 0256.

Stove and range manufacturer wants man capable of handling production in punch press and sheet metal departments; Personnel Service, having no listing, places this advertisement. 0259.

Midwest West gas company has an opening for a man experienced in sales promotion and customer relations. Would like applicant to state qualifications, experience, etc. in first letter. 0259.

## TEMPORARY WORK

In the *Services Offered* columns and in confidential classification records, there is information from which lists of competent personnel may be prepared for all branches of the industry. Gas companies, manufacturers of equipment and appliances requiring engineers, operators, salesmen, accountants, etc., for temporary work can readily be supplied with comprehensive details of suitable men not now employed.

# AMERICAN GAS ASSOCIATION, INC.

HEADQUARTERS, 420 LEXINGTON AVE., NEW YORK, N. Y.

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